# U. S. Air Carrier Operations
# Calendar Year 2003


ANNUAL REVIEW OF AIRCRAFT ACCIDENT DATA

NTSB/ARC-07/01

PB2007-105389

National Transportation Safety Board

**THE CORRECTIONS BELOW ARE *INCLUDED***
**IN THIS VERSION OF THE PUBLISHED REPORT**

ANNUAL REVIEW OF AIRCRAFT ACCIDENT REPORT
NTSB/ARC-07/01 (PB2007-105389)

**U. S. AIR CARRIER OPERATIONS**
**CALENDAR YEAR 2003**

- Pages 33 – 66 (Appendix A, B, C and D), have been replaced. The incorrect pages were printed in the original version. (08 AUG 2007)

# Annual Review of Aircraft Accident Data

U.S. Air Carrier Operations, Calendar Year 2003

**NTSB/ARC-07/01**
**PB2007-105389**
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**National Transportation Safety Board**
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**National Transportation Safety Board. 2007. *U.S. Air Carrier Operations, Calendar Year 2003*. Annual Review of Aircraft Accident Data NTSB/ARC-07/01. Washington, D.C.**

**Abstract:** The National Transportation Safety Board's Review of *2003 Aircraft Accident Data: U.S. Air Carrier Operations* covers aircraft operated by U.S. air carriers under Title 14, Parts 121 and 135, of the *Code of Federal Regulations*. Air carriers are generally defined as operators that fly aircraft in revenue service. To provide an historical context for this 2003 review, data for the years 1994–2003 are also presented. Much of the information in this review is presented in graphs and tables. Readers who prefer to view or manipulate tabular data may access the data set online at http://www.ntsb.gov/aviation/stats.htm. A list of 2003 air carrier accidents is presented in appendix A.

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# INTRODUCTION

The National Transportation Safety Board's *Review of 2003 Aircraft Accident Data: U.S. Air Carrier Operations* covers aircraft operated by U.S. air carriers under Title 14,[1] Parts 121 and 135, of the *Code of Federal Regulations* (CFR). Air carriers are generally defined as operators that fly aircraft in revenue service. Data for the years 1994–2002 are included to provide an historical context for the 2003 statistics. Much of the information in this review is presented in graphs and tables. Readers who prefer to view or manipulate tabular data may access the data set online at http://www.ntsb.gov/aviation/stats.htm. Appendix A contains a list of the 2003 air carrier accidents discussed in this review.

**Part 121**

Usually includes operators that fly large transport-category aircraft.

An operation is scheduled if an air carrier or operator offers in advance the departure location, departure time, and arrival location.1

Any scheduled or nonscheduled passenger-carrying operation. Regulations limit Part 121 operations to controlled airspace and controlled airports that have available specific weather, navigational, operational, and maintenance support.

**Scheduled Part 135**

A scheduled passenger-carrying operation that flies to smaller airports that do not provide the services required to support Part 121 operations.

Includes commercial air carriers flying smaller jet and turboprop aircraft commonly referred to as commuter airlines. The definition for scheduled operations in Part 121 also applies to Part 135.

**On-Demand Part 135**

Any operation for compensation or hire for which the departure location, departure time, and arrival location are negotiated with the customer.

Customers can arrange to charter an entire aircraft or book a single seat on an air taxi.2

Also includes medical evacuation flights when a patient is on board.

A total of 130 accidents occurred among U.S. air carriers in 2003, up 20% from 2002: 54 Part 121 accidents, 2 scheduled Part 135 accidents, and 74 on-demand Part 135 accidents (table 1). In 2003, air carriers flew more than 8 billion miles, recorded at least 11 million departures, and logged almost 23 million flight hours.

[1] Title 14 is also known as the Federal Aviation Regulations (FARs).

Table 1: Accidents and Accident Rates for 2003

| | Number of Accidents | Accidents Per Million Flight Hours |
|---|---|---|
| **Part 121** | 54 | 3.09 |
| **Scheduled Part 135** | 2 | 6.3 |
| **On-Demand Part 135** | 74 | 25.3 |

As in the foregoing years, Part 121 air carriers had the lowest accident rates of all commercial operations (tables 1 and 2) in 2003, and accident rates for on-demand Part 135 air carrier operations were almost 10 times greater than rates for Part 121 operations. A total of 21 fatal accidents occurred in 2003: 2 for Part 121 operations, 1 for scheduled Part 135, and 18 for on-demand Part 135.

Table 2: Fatal Accidents, Fatalities, and Accident Rates for 2003

| | Number of Fatal Accidents | Fatalities | Fatal Accidents Per Million Flight Hours |
|---|---|---|---|
| **Part 121** | 2 | 22 | 0.12 |
| **Scheduled Part 135** | 1 | 2 | 3.13 |
| **On-Demand Part 135** | 18 | 42 | 6.10 |

## Activity Measures and Accident Rates

In 2003, the number of Part 121 accidents increased by 32% from 2002 and the number of on-demand Part 135 accidents increased by 22% (figure 1). In contrast, scheduled Part 135 showed a substantial decrease.

Some of the increase in Part 121 accidents can be attributed to the 13% increase in flight hours, which reached a 10-year peak in 2003 (figure 2). This increase in flight hours also indicates that the decrease in flight activity in 2001 and 2002 following the events of September 11 was no longer a factor. Similarly, flight hours for scheduled Part 135 operations increased in 2003 by 17%, contributing to the substantial reduction in the accident rate.

The increase in Part 121 accidents, hours, and departures beginning in 1997 can in part be explained by the reclassification of some scheduled Part 135 operations to Part 121 in March of that year (the effect of this reclassification is discussed in more detail in appendix C). Interestingly, neither Part 121 nor scheduled Part 135 operations (figure 3) exhibited an

increase in departures, as might be expected from the increased number of flight activity hours. In fact, Part 121 departures in 2003 continued to decline from the peak that was reached in 2000.

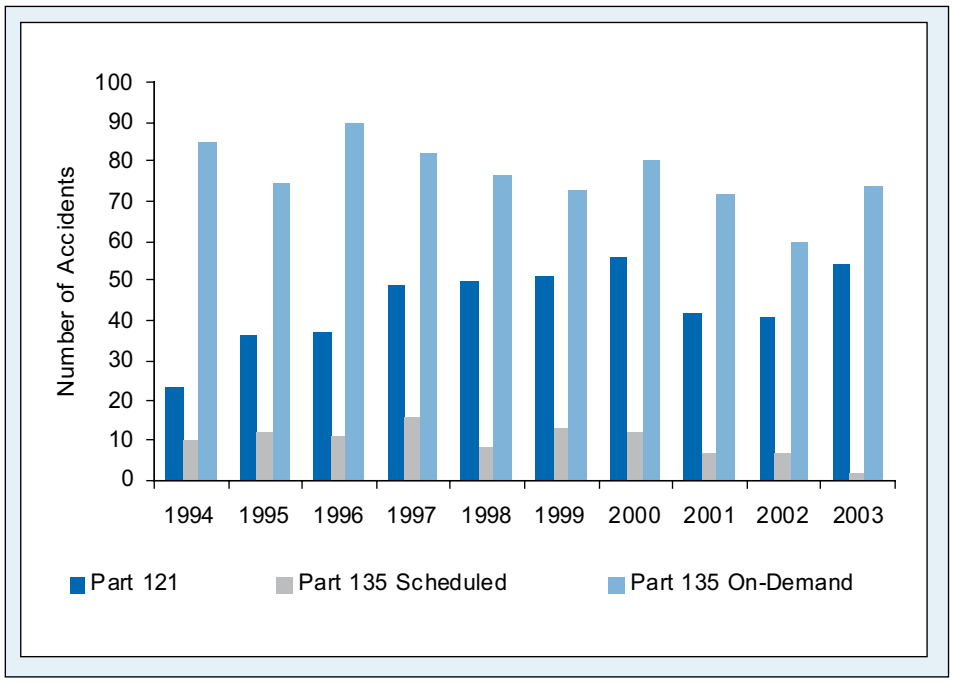


Figure 1: U.S. Air Carrier Accidents by FAR Part, 1994-2003

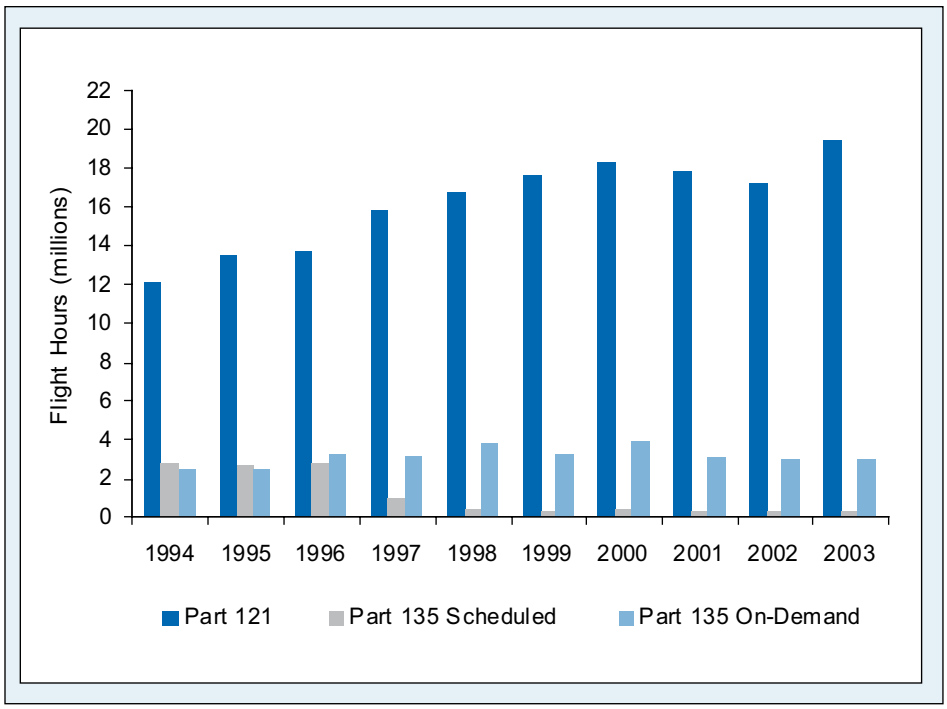


Figure 2: Flight Hours by FAR Part, 1994-2003

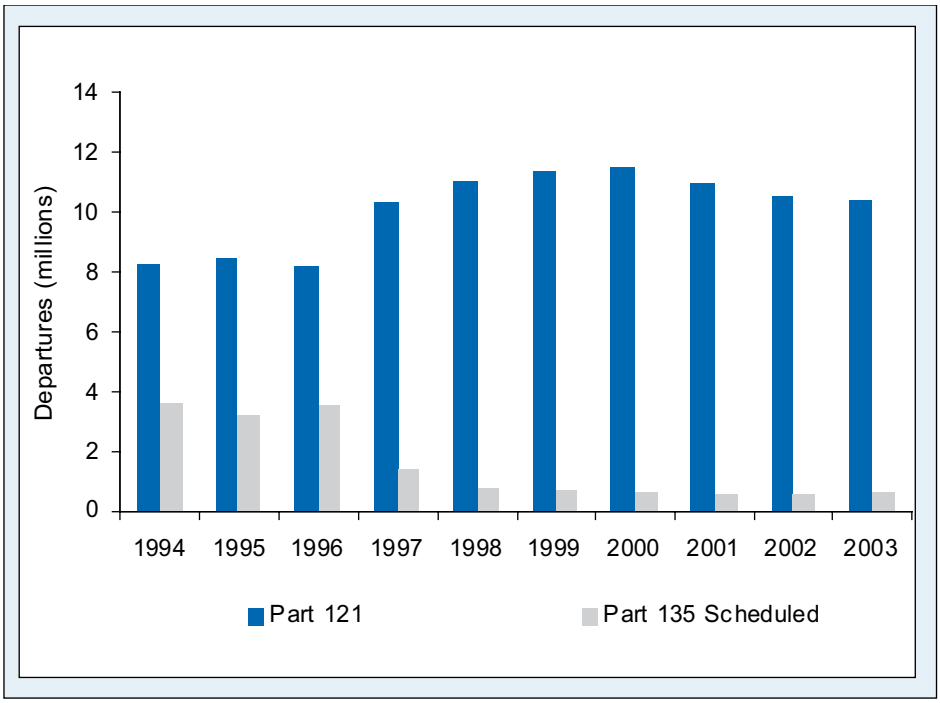


Figure 3: Scheduled Departures by FAR Part, 1994-2003

The flight activity data shown in figure 2 are compiled differently depending on the type of operation. Part 121 and scheduled Part 135 operations are required to report actual flight hours, and as a result, flight activity data for these operations are considered to be accurate. In contrast, on-demand Part 135 operations are not required to report flight activity data. Instead, these data are estimated using the voluntary *General Aviation and Air Taxi Activity* (*GAATA*) *Survey*, which the Federal Aviation Administration (FAA) compiles annually from a sampling of owners of general aviation and on-demand Part 135 aircraft. Information gathered for the *GAATA Survey* includes flight hours, avionics, base location, and use, but does not include miles flown or departures. The small proportion of on-demand Part 135 aircraft surveyed, combined with a sample based on aircraft owners rather than operators and low survey response rates, produces an imprecise activity estimate.

Estimates of on-demand Part 135 aircraft activity are further complicated by the fact that, in 2002, the FAA changed its estimating method and revised its flight-hour estimates for on-demand Part 135 operations. The revised method calculates activity based on the number of aircraft assumed to operate in on-demand operations[2] and the average number of flight hours reported on the *GAATA Survey*, and was applied retroactively to survey data for 1992–2002. As a result, FAA's flight-hour estimates for on-demand Part 135 flight operations beginning in 1992 are substantially

[2] Data are derived from the FAA's Vital Information Subsystem, a database used to track commercial and government operations certificates.

higher than they would have been using the previous method, and accident rates are consistently lower. This review uses the revised activity measures for on-demand Part 135 operations. The way in which on-demand Part 135 flight hours are estimated is discussed in more detail in appendix C.

Beginning with the reclassification of air carrier operations in 1997, scheduled Part 135 operations began to represent a small segment of air carrier operations. In 2003, scheduled 135 operations accounted for less than 1.5% of air carrier flight hours (figure 2) and just 5% of scheduled air carrier departures (figure 3). As a result, scheduled Part 135 operations accounted for a small proportion of Part 135 accidents (figure 4). Consequently, the discussion of scheduled Part 135 operations in this review is minimal and focuses instead on on-demand (air taxi and charter) operations.

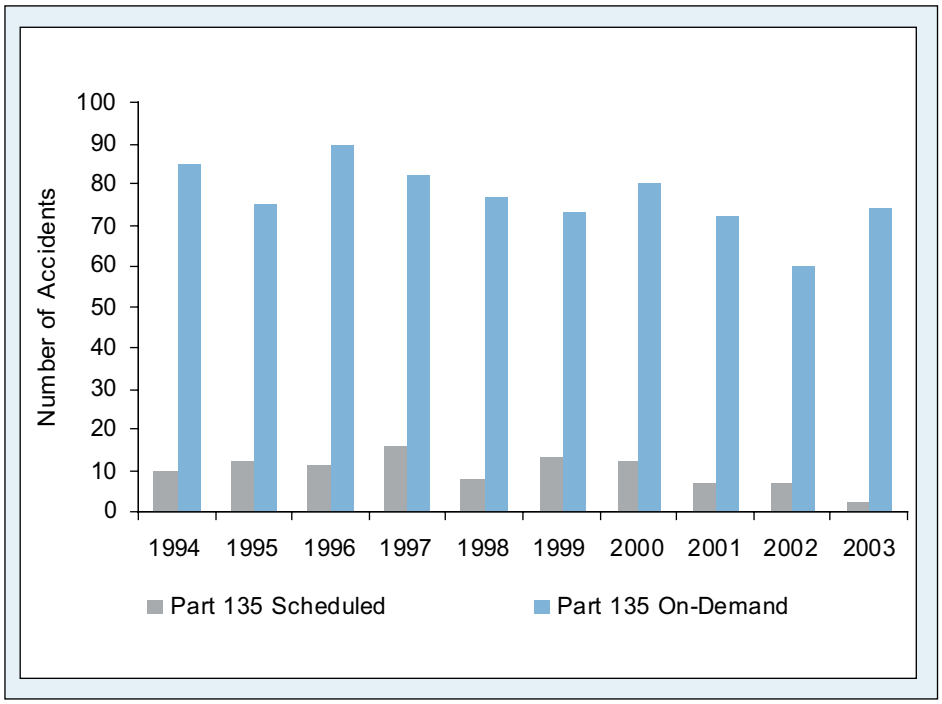


Figure 4: Part 135 Accidents by Type of Operation, 1994-2003

## Fatal Accidents, 1994 through 2003

Although the number of Part 121 accidents increased from 1994 through 2003, the number of fatal Part 121 accidents remained relatively constant and low (figure 5). The number of on-demand Part 135 fatal accidents varied considerably from year to year (also shown in figure 5), but the number of fatal accidents in 2003 was substantially lower than in 2002, despite the increase in accidents. In fact, 2003 recorded the fewest number of on-demand Part 135 fatal accidents in the 10-year period. In general, fatal Part 121 accidents accounted for the least number of air carrier accidents (less than 2%), whereas fatal on-demand Part 135 accidents accounted for the most (8.5%).

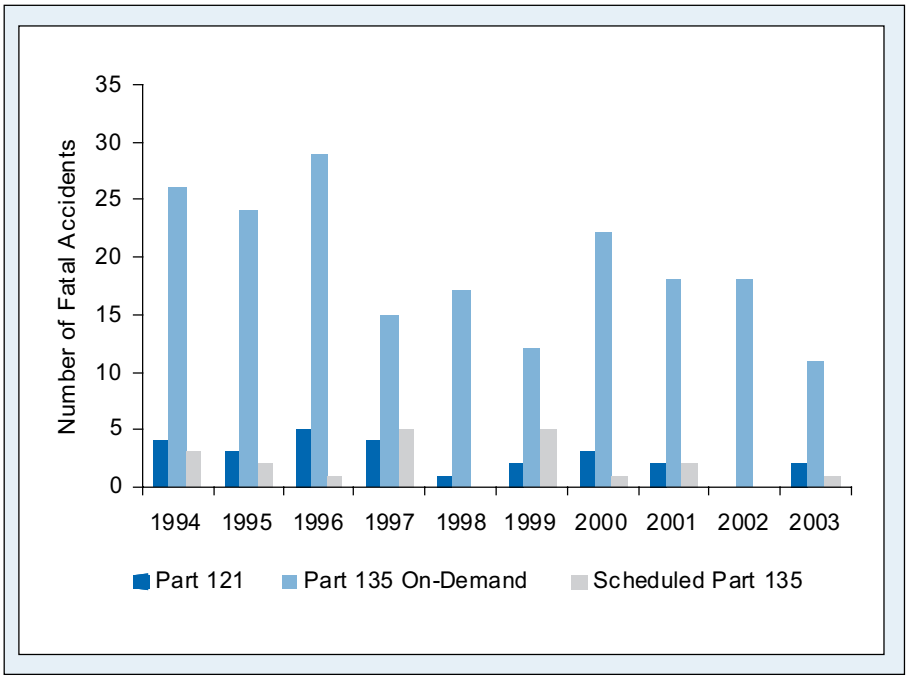


Figure 5: U.S. Air Carrier Fatal Accidents by FAR Part, 1994-2003

The number of Part 121 accidents increased slightly over the 10-year period (figure 3), but the accident rate remained relatively constant (figure 6). On-demand Part 135 accident rates decreased overall from 1994–1998, rising slightly after 1998, and ranging between 20 and 25 accidents per million flight hours. Throughout the period, the accident rate for on-demand Part 135 operations (and for Part 135 operations in general) remained almost 10 times greater than the Part 121 rate, reflecting the variety of operating conditions and aircraft found in air taxi, air tour, and air medical operations. The following sections focus in turn on accident data for Part 121 and Part 135 air carrier operations.

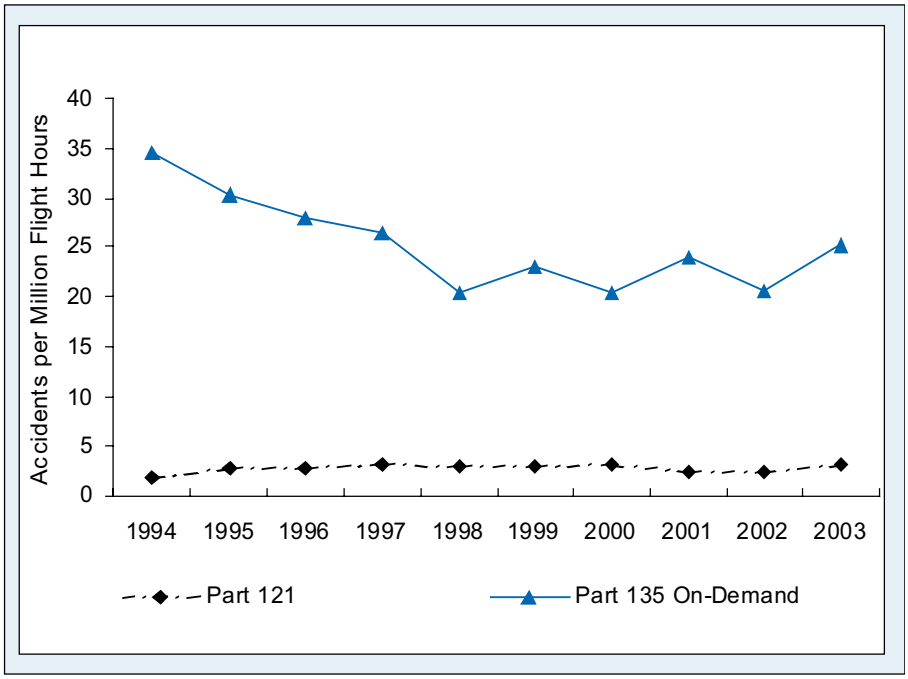


Figure 6: U.S. Air Carrier Accident Rates by FAR Part, 1994-2003

# PART 121 ACCIDENTS IN 2003

In 2003, Part 121 air carriers carried more than 595 million passengers a total of 7.3 billion miles and accumulated more than 17.5 million flight hours. The 54 Part 121 accidents involved 54 aircraft, producing an accident rate of 3.1 accidents per million flight hours and a fatal accident rate of .12 accidents per million flight hours. These accidents resulted in 22 fatalities, 31 serious injuries, and 73 minor injuries, as shown in table 3. A list of the 2003 Part 121 accidents can be found in appendix A.

Both the number of passengers injured in Part 121 accident flights (table 3) and the risk of injury remained low in 2003: only 1 of every 7.3 million passengers who boarded a Part 121 air carrier flight was injured in an accident, and only 1 of every 150,000 Part 121 passengers was involved in an accident. Of the 3,959 passengers involved in Part 121 accidents, only 2% received any type of injury. The number of flight and cabin crewmembers injured in Part 121 accidents was also small: of the 110 flight crewmembers involved, only 4 sustained injuries, and of the 154 cabin crew involved, 29 sustained injuries. Cabin crewmembers were more than five times as likely to be injured as flight crewmembers.

Table 3: Part 121 Injuries by Role in 2003

| | Fatal | Serious | Minor | None | Total |
|---|---|---|---|---|---|
| Flight crew | 2 | 1 | 1 | 106 | 110 |
| Cabin crew | | 17 | 12 | 125 | 154 |
| Other crew | | 2 | | 39 | 41 |
| Passengers | 19 | 10 | 53 | 3,877 | 3,959 |
| **Total aboard** | **21** | **30** | **66** | **4,147** | **4,264** |
| Other Aircraft | | | | 188 | 188 |
| On ground | 1 | 1 | 7 | | 9 |
| **Total** | **22** | **31** | **73** | **4,335** | **4,461** |
| | | | | | |
| Accidents | 2 | 26 | 3 | 23 | **54** |

Three Part 121 accidents occurred outside of the United States and its territories. In addition, three accidents were cargo-only flights. The list of accidents is presented in appendix A.

## Accidents, Accident Severity, and Injuries

The number of Part 121 accidents more than doubled after 1994, reaching a peak in 2000 (figure 7), primarily due to an increase in nonfatal injury-only and damage-only accidents.[3] After 1994, the number of nonfatal injury-only accidents doubled and damage-only accidents tripled, while the most serious types of accidents—those resulting in fatalities and substantial damage to the aircraft (either *major* or *serious* in severity)—remained at a constant, low level. The data for 2003 were consistent with previous years: almost all of the accidents (91%) were nonfatal injury-only (44%) or damage-only accidents (46%). Accident rates based on flight hours (figure 8) show the same pattern and highlight how much the rate of damage-only accidents increased and how little the rate of more severe accidents changed from 1994 to 2003. The notable exception was the reversal in the 2003 nonfatal injury-only accident rate from previous years; this accident rate declined after 1997, reaching an all-time low in 2002 before almost doubling in 2003. Figure 8 shows that over the decade the rates for major and serious accidents remained low for Part 121 operations, especially compared with the rates for nonfatal injury-only and damage-only accidents.

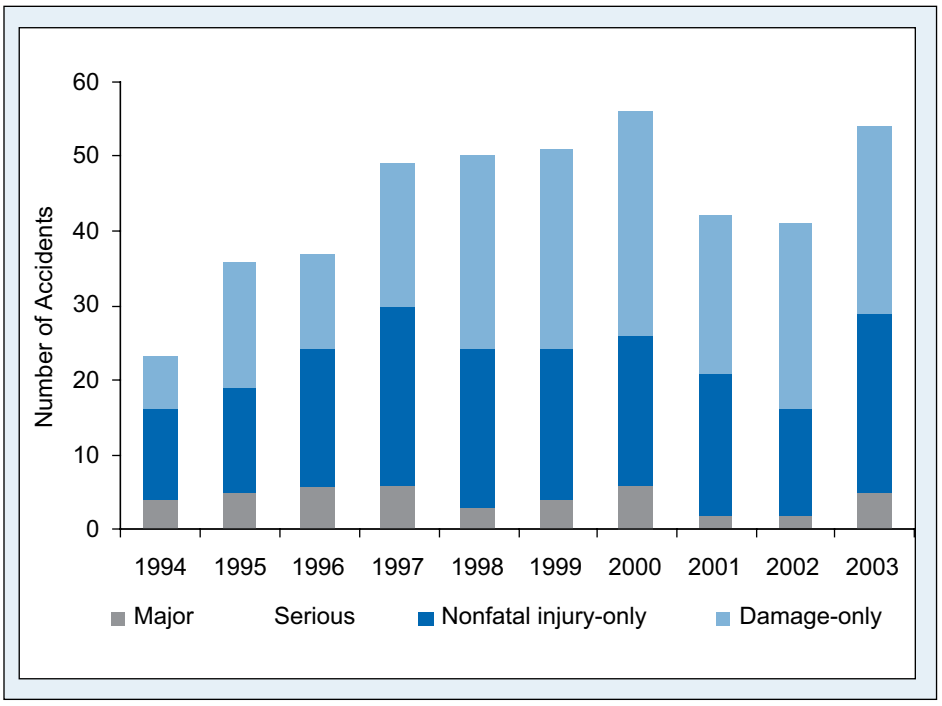


Figure 7: Part 121 Accidents by Severity Classification, 1994-2003

[3] The severity of a Part 121 accident is classified into one of four categories defined in appendix B. Briefly, an accident is major if there is at least one fatality and substantial damage to the aircraft, serious if there is at least one serious injury and substantial damage to the aircraft; injury-only if there are nonfatal injuries and no damage to the aircraft; and damage-only if there are no injuries but the aircraft is substantially damaged.

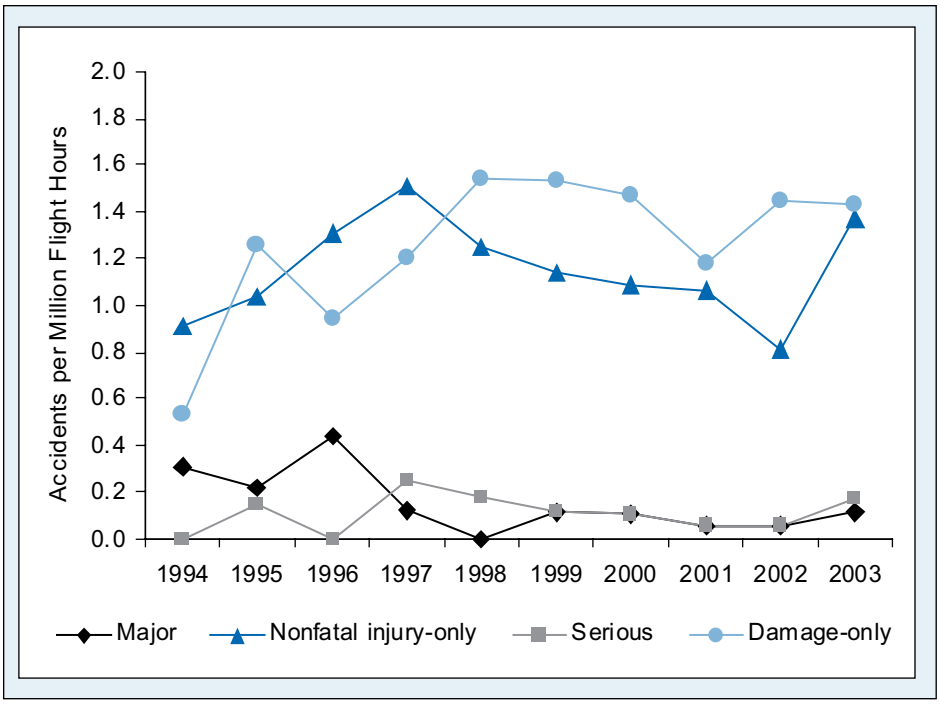


Figure 8: Part 121 Accident Rates (using Flight Hours) by Severity Classification 1994-2003

However, these data, especially injury data, can be dramatically affected by a few severe accidents in a given year. For instance, figure 9 shows that a large number of fatalities (1,053 total) occurred in 1994, 1995, 1996, and 2001; almost all of these injuries (965) were attributed to just 6 of the 439 Part 121 accidents[4] that occurred in the decade 1994–2003. In general, however, the proportion of people injured in Part 121 accidents during the 10-year period was small.[5]

[4] USAir flight 427 on September 8, 1994, resulted in 132 fatalities; American Eagle flight 4184 on October 31, 1994, resulted in 68 fatalities; American Airlines flight 965 on December 20, 1995, resulted in 160 fatalities; ValuJet flight 592 on May 11, 1996, resulted in 110 fatalities; TWA flight 800 on July 17, 1996, resulted in 230 fatalities; and American Airlines flight 587 on November 12, 2001, resulted in 265 fatalities.

[5] National Transportation Safety Board, *Survivability of Accidents Involving Part 121 U.S. Air Carrier Operations, 1983 through 2000*, Safety Report NTSB/SR-01/01 (Washington, DC: National Transportation Safety Board, 2001).

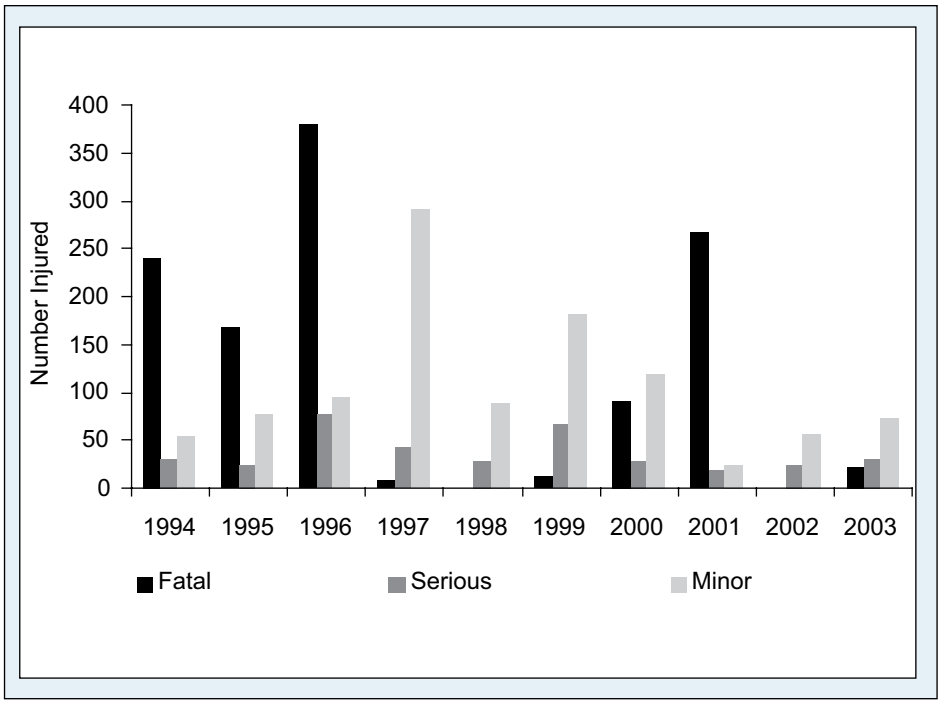


Figure 9: Number Injured by Level of Injury, Part 121 Accidents, 1994-2003

In addition, the survivability of serious accidents over the 10 years remained quite high (tables 4, 5, 6, and 7); 88% of the accidents producing minor injuries and 94% of the accidents producing no injuries were associated with substantially damaged aircraft. As shown in figure 7, such low-injury, damage-producing accidents increased toward the end of the 10-year period.

In contrast, 23 serious-injury accidents involved no damage to the aircraft (table 5). Most of those accidents (74%) were the result of encounters with turbulence, a topic discussed later in this review. On average, 94% of the accidents in 1994–2003 that produced serious injuries resulted in minor or no damage to the aircraft.

Table 4: Part 121 Fatal Accidents for Each Level of Damage, 1994 - 2003

| | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|
| Destroyed | 3 | 3 | 4 | 1 | | 1 | 2 | 1 | | 1 |
| Substantial | 1 | | 1 | | | | | | | |
| Minor | | | | 1 | 1 | 1 | 1 | 1 | | 1 |
| None | | | | 2 | | | | | | |

Table 5: Part 121 Serious-Injury Accidents for Each Level of Damage, 1994 - 2003

| | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|
| Destroyed | | | | | | | | | 1 | |
| Substantial | | 2 | | 1 | 2 | 1 | 2 | | 1 | 2 |
| Minor | 3 | | 5 | 5 | 6 | 2 | 3 | | 2 | 1 |
| None | 9 | 14 | 13 | 19 | 15 | 18 | 17 | 19 | 12 | 23 |

Table 6: Part 121 Minor-Injury Accidents for Each Level of Damage, 1994 - 2003

| | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|
| Destroyed | | | 1 | 1 | | 1 | 1 | | | 1 |
| Substantial | 3 | 1 | 5 | 6 | 7 | | 6 | 6 | 1 | 2 |
| Minor | | | | | | | | | | |
| None | | | | | | | | | | |

Table 7: Part 121 No-Injury Accidents for Each Level of Damage, 1994 - 2003

| | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|
| Destroyed | | | | | | | | | | |
| Substantial | 4 | 15 | 8 | 13 | 19 | 27 | 23 | 15 | 23 | 23 |
| Minor | | 2 | 2 | | | 1 | 1 | 2 | | |
| None | | | | | | | 1 | | 1 | |

## Occurrences, Causes, and Factors

Investigators describe the events that take place during an accident as a sequence of occurrences, each identified with a phase of flight. The first occurrence associated with phase of flight describes the initiating event or starting point for an accident. Table 8 shows first occurrence data by phase of flight for Part 121 accidents. Appendix C discusses occurrences in more detail and how they are coded. First occurrence data for 51 of the 54 accidents that occurred in 2003 were available for this analysis.

Table 8: Part 121 First Occurrences by Phase of Flight for 2003

| | Takeoff or Climb | Cruise or Descent | Approach or Landing | Taxiing or Standing | Total |
|---|---|---|---|---|---|
| In-flight Encounter with Weather | 3 | 14 | | | 17 |
| On Surface Collision with Object | | | 1 | 11 | 12 |
| Miscellaneous/Other | | | | 6 | 7 |
| Airframe, Component, System Failure | | | 2 | 2 | 4 |
| In-flight Collision with Object | 1 | | 2 | | 3 |
| Loss Of Control - In-flight | 1 | | 1 | | 2 |
| On Ground/Water Loss of Control | | | 1 | 1 | 2 |
| Collision Between Aircraft (not midair) | | | | 1 | 1 |
| Hard Landing | | | 1 | | 1 |
| Loss of Engine Power (Partial) Mechanical | | 1 | | | 1 |
| Overrun | | | 1 | | 1 |
| **Total Accident Airplanes** | 5 | 15 | 9 | 21 | 51 |

Taxiing and standing, which characterize ground operations, were the most frequently cited first occurrences for Part 121 operations and accounted for 40% of the Part 121 accidents in 2003. Half of these accidents involved collisions with an object during pushback, while maneuvering the airplane on the ground, or when the airplane was struck by ground vehicles. After taxiing and standing, cruise or descent accounted for the most first occurrences: 30%.

In flight, encounters with weather were the most frequently cited accident-initiating event in Part 121 operations and occurred most often during cruise and descent. In 2003, all in-flight encounters with weather during cruise and descent were attributed to turbulence.

More than half of the approach and landing first occurrences resulted from encounters with weather or from a collapsed gear, a dragged wing, or a tail skid. Other first occurrences included an airframe, component, or system failure and a bird strike.

Table 9 relates the severity of an accident to phase of flight for the initiating event. Standing or taxiing accidents most often resulted in a damaged aircraft but few injuries, while cruise or descent were more often

associated with non-fatal injury-only accidents (which is consistent with turbulence). Almost all of the accidents (90%) resulted in non-fatal injuries or airplane damage.

Table 9: Part 121 Accident Initiating Event, Severity Classification by Phase of Flight, 2003

| | Takeoff or Climb | Cruise or Descent | Approach or Landing | Standing | Taxiing | Total |
|---|---|---|---|---|---|---|
| Major | 1 | | 1 | | | 2 |
| Serious | | | 1 | 2 | | 3 |
| Injury | 3 | 14 | 1 | 2 | 2 | 23 |
| Damage | 1 | 1 | 6 | 3 | 12 | 23 |
| **Total** | 5 | 15 | 9 | 7 | 14 | 51 |

Within each accident occurrence, any information that helps explain why that event happened is designated as either a "cause" or "factor." In addition are findings that provide information of interest to the investigation. For most of the 10-year period, personnel were cited as a cause or factor in 70 to 80% of all Part 121 accidents, followed by environment-related causes, and then by aircraft-related causes. Calendar year 2003 was an exception to this pattern, as shown in figure 10: personnel and the environment were cited almost equally in half of the accidents, and aircraft factors were cited in only 16% of the accidents. Aircraft-related causes/factors hit a new low for the 10-year period, and the number of accidents citing the environment increased overall.

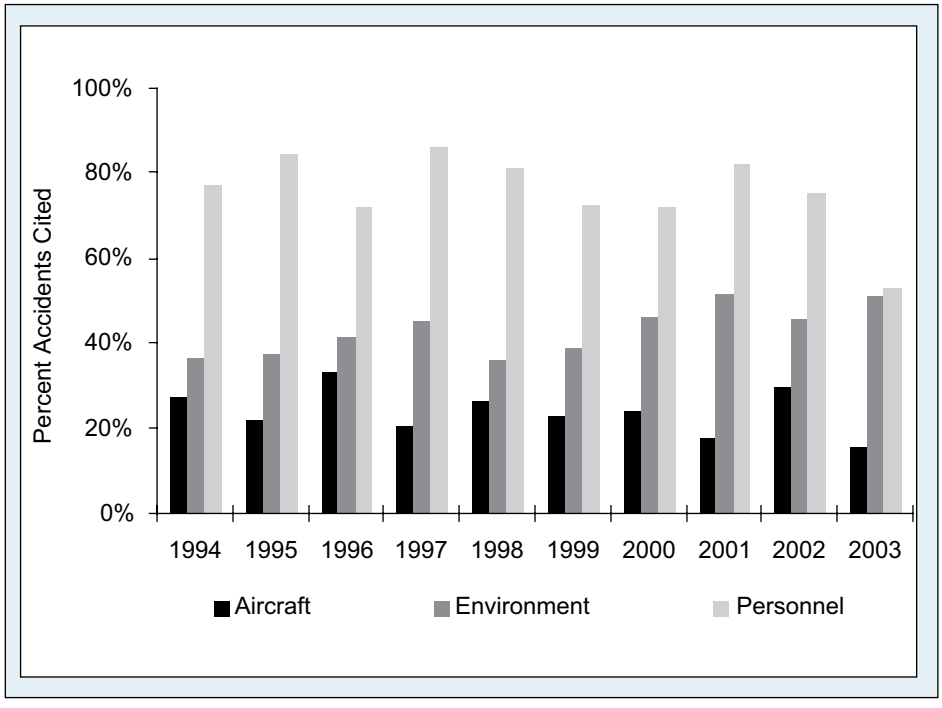


Figure 10: Broad Causes/Factors for Part 121 Accidents, 1994-2003

Figure 11 provides more detail about Part 121 accident causes and factors within the broad categories of personnel, aircraft, and environment. These data show the proportion of accidents where a specific cause or factor was cited at least once in the accident. Pilots were typically the most frequently cited cause or factor over the years, but not in 2003. Instead, others not on board were the most frequently cited personnel (35%), reflecting the large number of accidents attributable to ramp personnel. In addition, weather was cited more frequently (33%) than pilots and was the second most frequently cited cause or factor. No specific aircraft component or equipment could be singled out as the leading cause or factor in aircraft-related accidents.

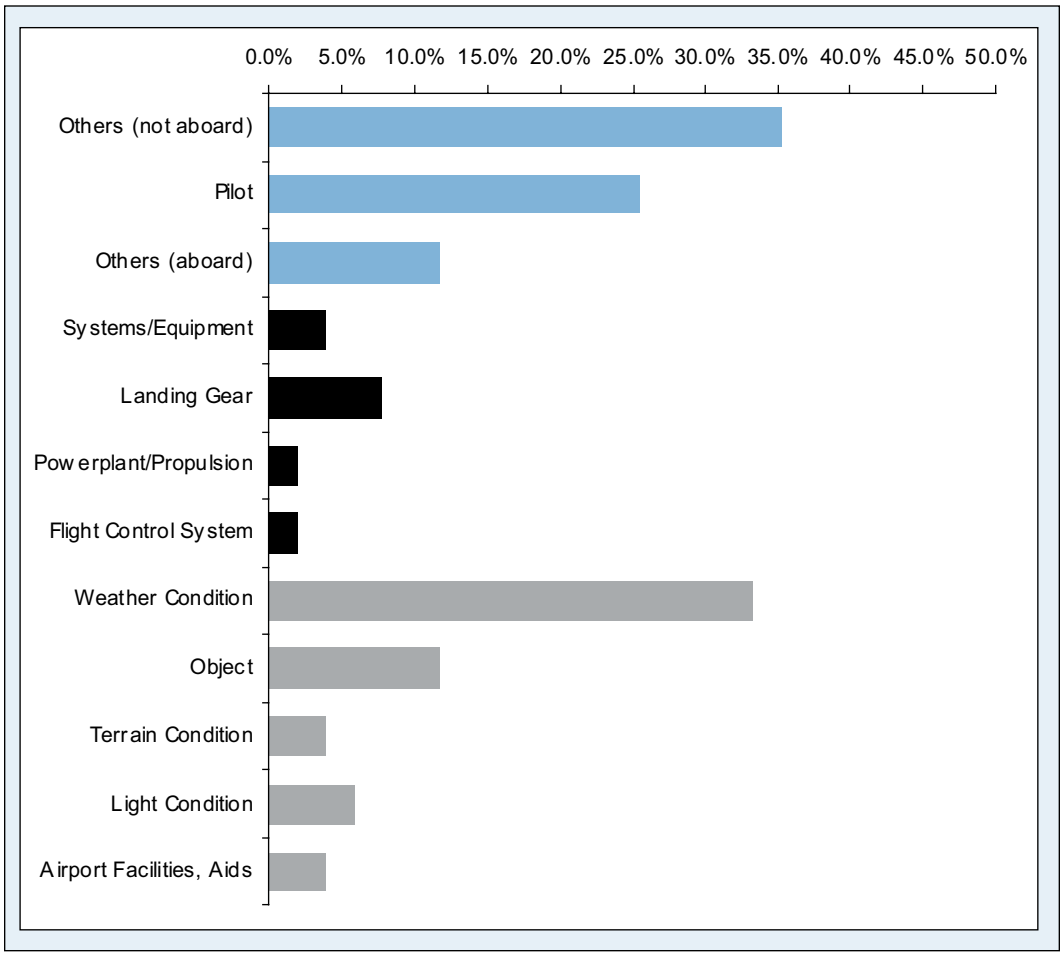


Figure 11: Top Causes/Factors in Part 121 Accidents for 2003

In 2003, turbulence was cited as a cause or factor in a quarter of all Part 121 accidents and accounted for more than half of all serious-injury accidents (table 10). Turbulence typically accounted for about 20% of all Part 121 accidents from 1994–2003 and was the leading cause or factor in all Part 121 accidents producing serious injuries. Table 11 shows that turbulence

Table10: Part 121 Turbulence Accidents by Highest Level of Injury, 1994 - 2003

| | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|
| Fatal | | | | 1 | | | | | | |
| Serious | 5 | 9 | 9 | 12 | 8 | 11 | 12 | 9 | 7 | 14 |
| **% Total Accidents** | 21.7% | 25.0% | 24.3% | 26.5% | 16.0% | 21.6% | 21.4% | 19.6% | 17.1% | 25.9% |
| **% Serious Injury Accidents** | 41.7% | 56.3% | 50.0% | 48.0% | 34.8% | 52.4% | 54.5% | 47.4% | 43.8% | 53.8% |

resulted in serious injuries, but caused little or no damage to the aircraft.

Table 11: Part 121 Turbulence Accidents for Each Level of Damage, 1994 - 2003

| | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|
| Substantial | | | | | 1 | | | | | |
| Minor | | | 2 | 2 | 1 | 2 | 2 | | 1 | |
| None | 5 | 9 | 7 | 11 | 6 | 9 | 10 | 9 | 6 | 14 |

## International Major Air Carrier Accidents

The Part 121 accidents that occurred in the United States accounted for half of all scheduled major air carrier accidents that occurred worldwide in 2003. According to the International Civil Aviation Organization (ICAO),[6] there were 51 reportable major air carrier accidents in other countries. A summary of the accidents by world region is shown in table 12.

Table 12: International Reportable Accidents by World Region in 2003

| | Number of Accidents | Number of Fatal Accidents |
|---|---|---|
| **United States & Canada** | 59 | 2 |
| **Central & South America** | 9 | 1 |
| **Europe & Russian Federation** | 16 | 1 |
| **Africa & Middle East** | 10 | 3 |
| **Asia & Pacific** | 11 | 1 |

[6] ICAO was established in 1944 by 52 member states to secure international cooperation in establishing uniformity in regulations and standards, procedures, and organization in civil aviation. One ICAO activity is to provide the aviation community with safety-related information, including accident and activity data. More about ICAO can be found at http://www.icao.int/.

The fact that the United States accounts for such a large proportion of the worldwide accident total is not surprising when air carrier activity is considered. Flight hours and departures as reported by ICAO for the top 10 countries in 2003 are shown in tables 13 and 14, respectively. The data show that Part 121 air carriers in the United States reported almost 10 times more flight hours and departures than the most active countries in the rest of the world.

Table 13: 2003 Top 10 Most Active Countries Based On Flight Hours

| | Domestic | International | Total |
|---|---|---|---|
| **United States** | 12,768,201 | 2,512,788 | 15,280,990 |
| **United Kingdom** | 342,627 | 1,523,995 | 1,866,623 |
| **China** | 1,548,805 | 249,771 | 1,798,576 |
| **Germany** | 217,154 | 1,169,506 | 1,386,661 |
| **France** | 277,185 | 907,770 | 1,184,955 |
| **Japan** | 530,778 | 534,739 | 1,065,517 |
| **Spain** | 438,750 | 435,823 | 874,573 |
| **Canada** | 259,514 | 466,917 | 726,431 |
| **Italy** | 241,363 | 410,426 | 651,789 |
| **Australia** | 277,836 | 260,467 | 538,303 |

Table 14: 2003 Top 10 Most Active Countries Based On Departures

| | Domestic | International | Total |
|---|---|---|---|
| **United States** | 7,989,329 | 735,720 | 8,725,049 |
| **China** | 881,102 | 59,679 | 940,781 |
| **United Kingdom** | 341,803 | 549,351 | 891,154 |
| **Germany** | 209,485 | 444,740 | 654,225 |
| **Spain** | 363,378 | 155,458 | 518,836 |
| **France** | 191,825 | 292,774 | 484,599 |
| **Japan** | 371,101 | 96,630 | 467,731 |
| **Italy** | 194,818 | 146,626 | 341,444 |
| **Brazil** | 321,235 | 6,109 | 327,344 |
| **Mexico** | 199,560 | 62,738 | 262,298 |

Accident rates provide a way to compare accident risk in different parts of the world. Given the discrepancies that occur in the worldwide reporting of accidents, only the number of fatal accidents is considered reliable. Fatal accident rates were calculated (table 15) based on the number of fatal accidents, flight hours, and departures reported by ICAO. North America, Europe, and Asia produced the lowest fatal accident rates in 2003, while Central America, South America, Africa, and the Middle East produced the highest rates. In fact, the fatal accident rate for Africa and the Middle East was at least 10 times greater than the North American rate for both flight hours and departures.

Table 15: 2003 Fatal Accident Rates by World Region

| | Fatal Accidents per Million Flight Hours | Fatal Accidents per Million Departures |
|---|---|---|
| **United States & Canada** | 0.12 | 0.19 |
| **Central & South America** | 0.56 | 0.84 |
| **Europe & Russian Federation** | 0.10 | 0.20 |
| **Africa & Middle East** | 1.54 | 3.62 |
| **Asia & Pacific** | 0.15 | 0.35 |

# PART 135 ACCIDENTS IN 2003

Part 135 applies to commercial air carriers that operate commuter flights (scheduled Part 135), charters and air taxis (on-demand Part 135), and cargo flights (which can be either scheduled or on-demand). In 2003, 76 Part 135 accidents occurred (table 16). Of these, the 2 scheduled and 74 on-demand accidents produced accident rates of 6.3 and 25.3 accidents per million flight hours, respectively. Part 135 accidents resulted in 44 fatalities, 13 serious injuries, and 46 minor injuries (table 17). The on-demand Part 135 accidents listed below accounted for 20 of the 44 fatalities, and details about these accidents can be found in appendix A:

- On May 28, 2003, a Cessna 185 was destroyed during a collision with snow-covered glacial terrain about 40 miles north-northwest of Talkeetna, Alaska, en route to a mountain climbing base camp located on the Kahiltna Glacier. The pilot and three passengers were fatally injured.

- On June 15, 2003, a McDonnell Douglas 369D helicopter impacted a lava field on Pulama Pali in the Volcanoes National Park, Volcano, Hawaii, while conducting an air tour. The pilot and three passengers were fatally injured.

- On July 23, 2003, a Bell 206B helicopter collided with terrain while maneuvering in the Waialeale Crater, Kauai, Hawaii, during an air tour flight. The helicopter impacted steep upsloping terrain on the northwestern inside crater wall and was destroyed. The pilot and four passengers were fatally injured.

- On September 20, 2003, an Aerospatiale AS350BA helicopter crashed after it collided with a canyon wall in the Grand Canyon, about 38 miles northwest of Peach Springs, Arizona, during an air tour flight. The pilot and all six passengers on board were fatally injured.

Table 16: Part 135 Accidents, Highest Injury by Type of Operation in 2003

| | Scheduled | On-Demand | Total |
|---|---|---|---|
| **Fatal** | 1 | 18 | 19 |
| **Serious** | 1 | 3 | 4 |
| **Minor** | 0 | 17 | 17 |
| **None** | 0 | 36 | 36 |
| **Total** | **2** | **74** | **76** |

Table 17: Part 135 Occupant Injuries, Injury Severity by Type of Operation in 2003

| | Scheduled | On-Demand | Total |
|---|---|---|---|
| **Fatal** | 2 | 42 | 44 |
| **Serious** | 1 | 12 | 13 |
| **Minor** | 6 | 40 | 46 |
| **None** | 4 | 122 | 126 |
| **Total** | **13** | **216** | **229** |

Although on-demand accidents accounted for most Part 135 accidents and injuries, the accident rates for both types of Part 135 operations differed substantially from 1994 through 2003 (figure 12). The on-demand Part 135 accident rate remained generally constant from 1998 through 2003, fluctuating between 20 and 25 accidents per 100,000 flight hours. The scheduled Part 135 accident rate rose considerably above the on-demand rate after the Part 121/Part 135 reclassification in 1997 and peaked in 1999, falling thereafter to a near record low in 2003. Note that the on-demand Part 135 accident rate was at its highest in 1994, and then steadily declined until 1998.

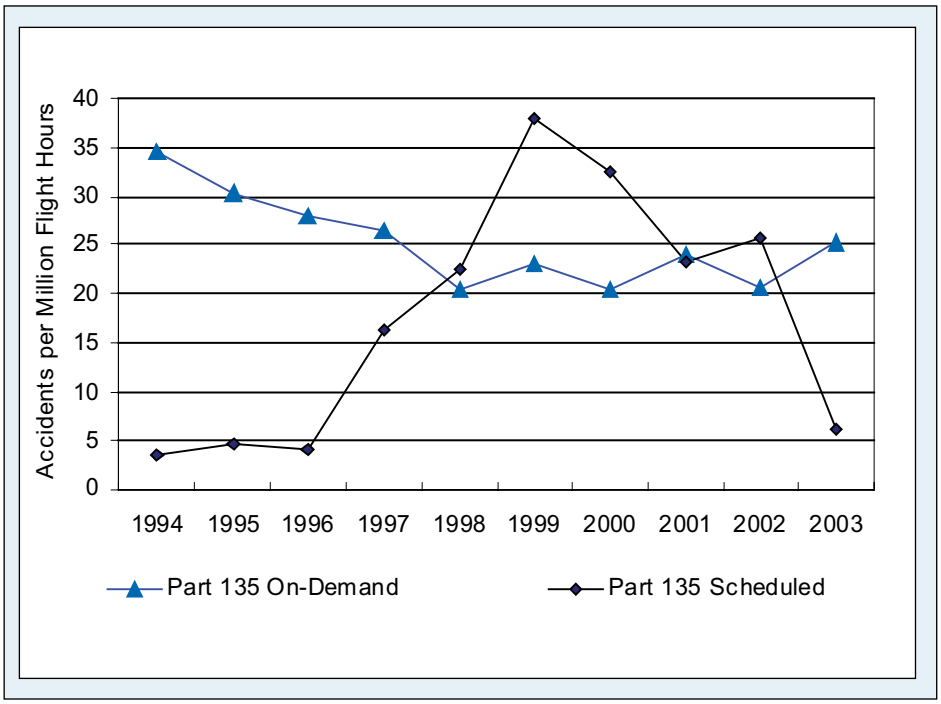


Figure 12: Part 135 Accident Rates, 1994-2003

In general, Part 135 accident rates were substantially higher than Part 121 accident rates in the same years. In 2003, the accident rate for on-demand Part 135 operations was nearly 10 times greater than for Part 121 operations, and the fatal accident rate was more than 50 times greater (as shown in tables 1 and 2). In 2003, the scheduled Part 135 accident rate was

only 6.3 accidents per million flight hours, and the fatal accident rate was only 3.1. The low rates for scheduled Part 135 operations were due to the few accidents in 2003 compared to previous years.

As previously mentioned, the FAA uses the *GAATA Survey* to estimate on-demand Part 135 flight hours. Although the fleet of on-demand Part 135 aircraft comprises both fixed-wing airplanes and helicopters, the FAA's revised flight-hour estimate does not distinguish between the two types of aircraft. The FAA bases its estimate of flight hours associated with airplanes and helicopters on the proportion of airplanes and helicopters in the charter and air taxi fleet as indicated in the *GAATA Survey*. In 2003, airplanes accounted for 71% of the fleet, and helicopters accounted for about 27% (table 18). As a result, the flight-hour estimates for fixed-wing airplanes and for helicopters presented in this review are based on the proportion of the fleet for each type of aircraft. For comparison, table 18 shows 2003 flight hours from the *GAATA Survey* as initially compiled and the estimate reported by the FAA using the revised method, along with flight hours for each type of aircraft. It is worth noting that, given the larger number of flight hours using the revised method, the overall accident rate is lower than it would be otherwise. See appendix C for a discussion of FAA's revised estimating method.

Table 18: Comparison of On-Demand Part 135 Flight Hours for 2003

| | On-Demand Active Fleet Size | Flight Hours Reported in the GAATA Survey | Flight Hours Using FAA Revised Estimate |
|---|---|---|---|
| Airplane | 2,625 | 1,252,188 | 2,072,108 |
| Helicopter | 1,007 | 591,498 | 794,900 |
| Overall[a] | 3,708 | 1,856,138 | 2,927,000 |

[a] In addition to airplanes and helicopters, the *GAATA Survey* estimate of the On-Demand Part 135 fleet includes 56 lighter-than-air and 18 experimental aircraft.

## On-Demand Part 135 Accidents

On-demand Part 135 accident rates for airplanes and helicopters in 2003, based on the FAA revised estimate of flight hours, are shown in table 19. Helicopters accounted for 36% of the on-demand Part 135 accidents and produced accident and fatal accident rates greater than those for airplanes. The proportion of on-demand Part 135 accidents attributable to helicopters steadily increased after 1997, with 2003 accounting for a greater proportion of helicopter accidents than for any of the previous years (table 20).

Table 19: On-Demand Part 135 Accidents, Fatal Accidents, and Accident Rates for 2003

| | Accidents | Fatal Accidents | Flight Hours | Accidents per million Flight Hours | Fatal Accidents per million Flight Hours |
|---|---|---|---|---|---|
| Airplane | 47 | 8 | 2,072,108 | 22.7 | 3.9 |
| Helicopter | 27 | 10 | 794,900 | 34.0 | 12.6 |
| Overall | 74 | 18 | 2,927,000 | 25.3 | 6.1 |

Table 20: On-Demand Part 135 Accidents, Airplanes and Helicopters, 1994 - 2003

| | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|
| Airplane | 68 | 66 | 80 | 73 | 66 | 59 | 63 | 54 | 43 | 47 |
| Helicopter | 17 | 10 | 11 | 10 | 11 | 15 | 17 | 18 | 17 | 27 |
| % Helicopter | 20% | 13% | 12% | 12% | 14% | 20% | 21% | 25% | 28% | 36% |

## On-Demand Part 135 Accident Severity and Injuries

Data for 2003 demonstrate that the potential for injury in on-demand Part 135 accidents is much greater than in Part 121 accidents. More than half the Part 135 accidents in 2003 resulted in injuries and a quarter of the accidents were fatal (table 16). Although less than 3% of the people on board Part 121 accident aircraft suffered any injury, almost 43% of the people on board on-demand Part 135 accident aircraft were injured (38% of the crew and 47% of the passengers), and more than 40% of the injuries were fatal (table 21). The pattern of injuries in 2003 was consistent with previous years with the most fatalities in the 10-year period occurring in 2000 and the least in 2002, as shown in figure 13. Although a few accidents can substantially increase the number of injuries in one year, the relatively small number of passengers carried by on-demand Part 135 aircraft limits the number of people that can be injured in a single accident.[7]

[7] On-demand Part 135 operators are limited to aircraft with a maximum seating capacity (not including the crew) of 9 passengers in piston-engine airplanes, 30 passengers in turbo-prop or jet airplanes, and 12 passengers in helicopters.

Table 21: On-Demand Part 135 Accident Injuries by Role for 2003

| | Fatal | Serious | Minor | None | Total |
|---|---|---|---|---|---|
| Flight crew | 15 | 4 | 12 | 52 | 83 |
| Cabin crew | | | | | 0 |
| Other crew | 0 | 0 | 4 | 6 | 10 |
| Passengers | 25 | 8 | 24 | 64 | 121 |
| **Total aboard** | **40** | **12** | **40** | **122** | **214** |
| On ground | 2 | 0 | 0 | 0 | 2 |
| Other aircraft | | | | | 0 |
| **Total** | **42** | **12** | **40** | **122** | **216** |
| | | | | | |
| **Accidents** | 18 | 3 | 17 | 36 | 74 |

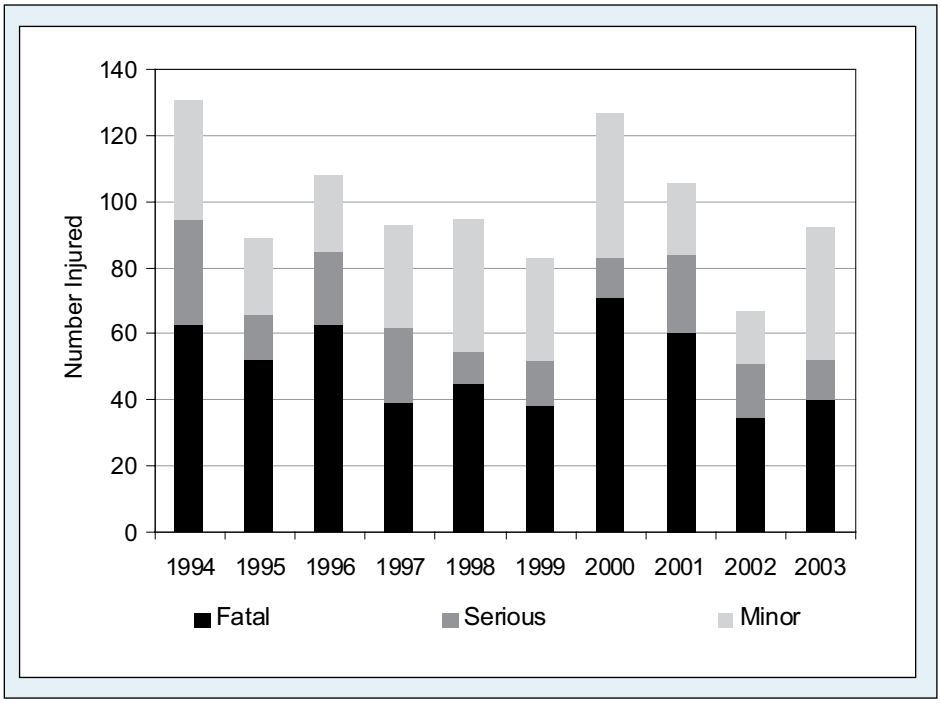


Figure 13: On-Demand Part 135 Accidents Number Injured by Level of Injury 1994-2003

As might be expected, the potential for fatal or serious injury increases with the level of aircraft damage. In 2003, 11 of the 18 fatal on-demand Part 135 accidents occurred when the aircraft was destroyed (table 22), and all 3 of the serious-injury accidents occurred when the aircraft was either destroyed or substantially damaged (table 23). This pattern was consistent from 1994 through 2003: 83% of the fatal accidents occurred when the aircraft was destroyed and 89% of the serious-injury accidents occurred when the

aircraft was substantially damaged or destroyed (table 23). However, the survivability of on-demand Part 135 accidents can be quite good: all but one of the minor-injury accidents and 98% of the no-injury accidents from 1994–2003 occurred when the aircraft was substantially damaged or destroyed (tables 24 and 25).

Table 22: On-Demand Part 135 Fatal Accidents for Each Level of Damage, 1994 - 2003

| | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|
| Destroyed | 21 | 19 | 28 | 14 | 15 | 11 | 19 | 15 | 13 | 11 |
| Substantial | 4 | 5 | 1 | 1 | 2 | 1 | 3 | 2 | 5 | 5 |
| Minor | | | | | | | | | | 2 |
| None | 1 | | | | | | | 1 | | |

Table 23: On-Demand Part 135 Serious-Injury Accidents for Each Level of Damage, 1994 - 2003

| | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|
| Destroyed | 1 | | 7 | 3 | | 2 | 2 | 1 | 2 | 2 |
| Substantial | 7 | 5 | 2 | 9 | 3 | 6 | 3 | 7 | 3 | 1 |
| Minor | | | | | | 1 | | | | |
| None | 1 | | 2 | 2 | | 1 | | 1 | | |

Table 24: On-Demand Part 135 Minor-Injury Accidents for Each Level of Damage, 1994 - 2003

| | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|
| Destroyed | 2 | 1 | 1 | 5 | 4 | | 2 | 1 | | 5 |
| Substantial | 11 | 6 | 9 | 9 | 12 | 11 | 12 | 6 | 5 | 12 |
| Minor | | | | | | | | | | |
| None | | | 1 | | | | | | | |

Table 25: On-Demand Part 135 No-Injury Accidents for Each Level of Damage, 1994 - 2003

| | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|
| Destroyed | | 1 | 1 | 1 | | | | 2 | 3 | |
| Substantial | 37 | 38 | 39 | 38 | 41 | 41 | 38 | 36 | 29 | 36 |
| Minor | | 1 | | 1 | | 1 | 1 | | 2 | |
| None | | | | | | | | | 1 | |

Helicopter accidents were a different story. In 2003, a person in a helicopter was more likely to be injured than a person in an airplane: 53% of the people in helicopters suffered some form of injury in an accident compared with 34% of the people in airplanes (table 26). In fact, twice as many people were fatally injured in helicopters as in airplanes, and fatalities represented a greater proportion of the injuries in helicopters (51%).

Table 26: On-Demand Part 135 Accident Injuries by Type of Aircraft in 2003

| | Airplane | Helicopter | Total |
|---|---|---|---|
| **Fatal** | 14 | 28 | 42 |
| **Serious** | 5 | 7 | 12 |
| **Minor** | 20 | 20 | 40 |
| **Total Injuries** | **39** | **55** | **94** |
| **Total Onboard** | **113** | **103** | **216** |

A substantial change in injury severity data for airplanes and helicopters occurred in 2003. Figures 14 and 15 show the proportion of injuries for airplanes and helicopters from 1994–2003, subdivided into fatal and nonfatal injuries. Except for 1996, 1998,[8] and 2003, the proportion of fatal injuries was always less in helicopters than in airplanes. In fact, between 1998 and 2003, the level of fatal injuries for helicopter accidents was lowest and the proportion of nonfatal injuries increased. In 2003, the number of helicopter fatalities increased substantially, resulting in an increase in the helicopter accident and fatal accident rates from previous years. Some of the difference between helicopters and airplanes apparently resulted from factors underlying on-demand Part 135 accidents, a topic discussed in the next section.

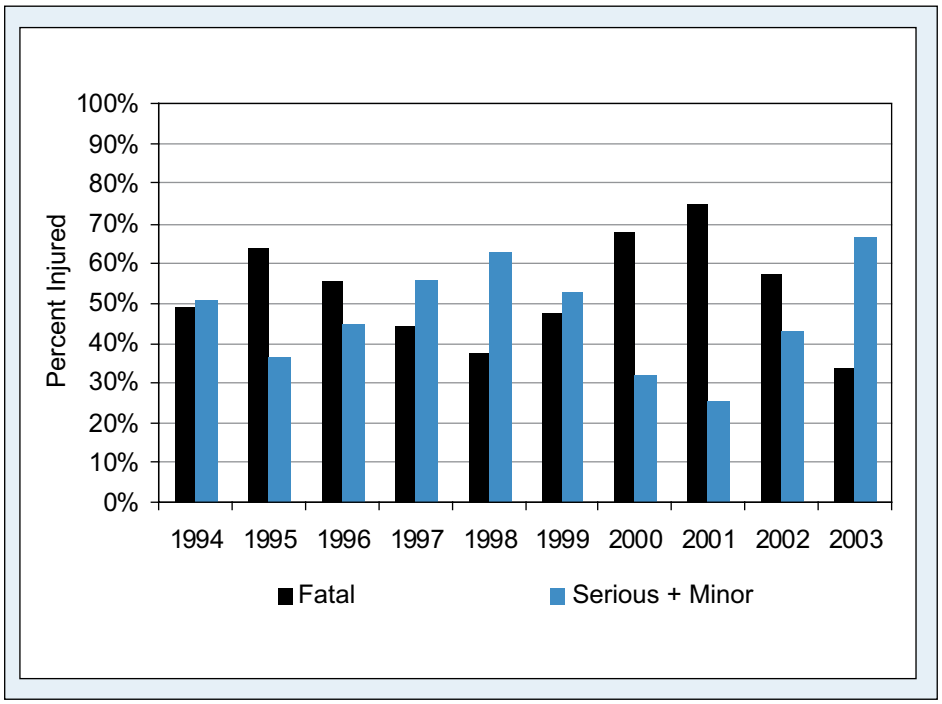


Figure 14: On-Demand Part 135 Airplane Accidents, Percent Injured by Level of Injury, 1994-2003

[8] In 1998, 3 accidents accounted for 15 of the 17 fatalities in on-demand helicopters: a sightseeing flight on the island of Kauai, Hawaii, on June 25 (6 fatalities); an air taxi flight at Indian Trail, North Carolina, on May 25 (5 fatalities); and a medical evacuation flight near Sandy, Utah, on January 11 (4 fatalities).

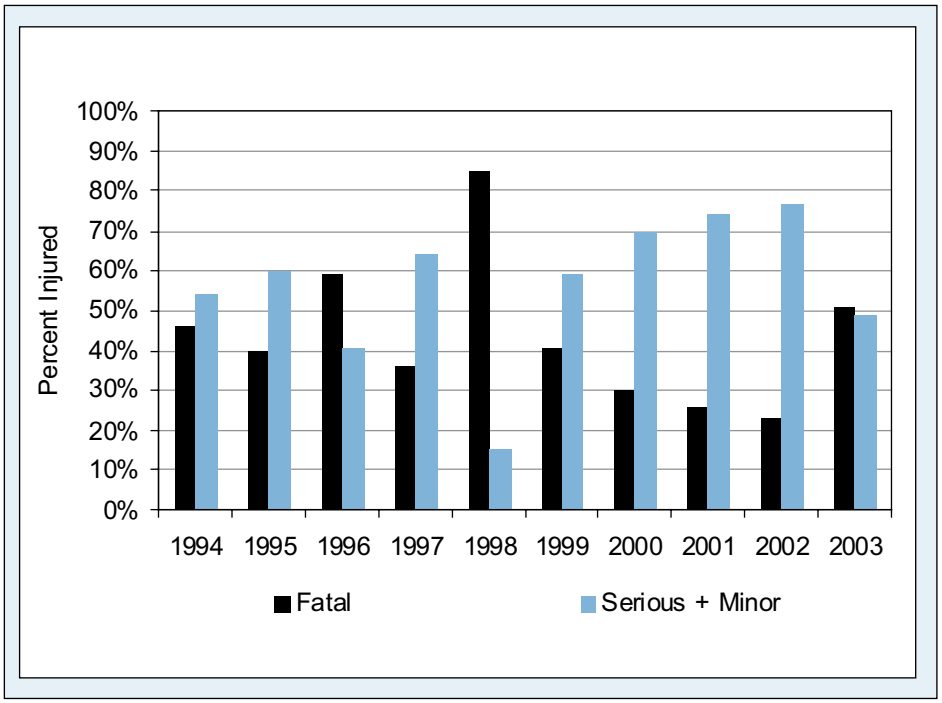


Figure 15: On-Demand Part 135 Helicopter Accidents, Percent Injured by Level of Injury, 1994-2003

## Occurrences, Causes, and Factors

The factors underlying on-demand Part 135 accidents are characterized in the data in the same way as for Part 121 accidents: as a sequence of occurrences, each identified with a phase of flight, that describe the events that took place during the accident. In association with occurrences, investigators also indicate the causes and factors in an accident. The first occurrence associated with phase of flight describes the initiating event for an accident flight. Appendix C discusses occurrence data and how they are coded by Safety Board investigators.

Table 27 shows first occurrence data by phase of flight for airplanes involved in on-demand Part 135 accidents. Approach or landing accounted for 44% of the airplane accidents (table 27) and most of the fatal and serious airplane accidents (table 28) in 2003. This pattern was consistent with Part 121 accidents with one notable exception: although most of the injury-producing accidents in Part 121 operations occurred in flight and were typically associated with turbulence, turbulence was rarely cited as a cause or factor in on-demand Part 135 accidents.

Although in-flight loss of control was the initiating event that occurred most often in on-demand Part 135 airplane accidents in 2003, a number of other types of initiating events, when combined, were equally frequent. For example, all types of in-flight collisions (with an object, terrain, or water) were as likely to

be the initiating event as in-flight loss of control (both accounted for about 16% of the accidents), as shown in table 27. Loss of engine power (for either mechanical or nonmechanical reasons) was also cited as frequently as in-flight loss of control.

Table 27: On-Demand Part 135 Airplanes, First Occurrences by Phase of Flight for 2003

| | Takeoff or Climb | Cruise or Descent | Approach or Landing | Maneuver | Standing or Taxiing or Other | Total |
|---|---|---|---|---|---|---|
| Loss of Control - In-flight | 2 | 1 | 4 | | | 7 |
| In-flight Collision with Terrain or Water | 2 | 1 | 1 | 1 | 1 | 6 |
| Loss of Engine Power (Total) Nonmechanical | 1 | 1 | 3 | | | 5 |
| Airframe, Component, or System Failure | | | 1 | | 1 | 2 |
| In-flight Collision with Object | | | 2 | | | 2 |
| In-flight Encounter with Weather | | 1 | 2 | | | 3 |
| Loss of Engine Power | 1 | 1 | | | | 2 |
| Loss Of Engine Power (Total) Mechanical | 1 | 1 | | | | 2 |
| Miscellaneous/Other | | | | | 2 | 2 |
| Nose Gear Collapsed | | | 2 | | | 2 |
| On Ground/Water Collision with Object | 1 | | | | 1 | 2 |
| Undershoot | | | 2 | | | 2 |
| Abrupt Maneuver | | | 1 | | | 1 |
| Collision Between Aircraft (Not Midair) | | | | | 1 | 1 |
| Fire | | | | | 1 | 1 |
| Hard Landing | | | 1 | | | 1 |
| Loss of Control - On Ground/Water | | | 1 | | | 1 |
| Main Gear Collapsed | | | | | 1 | 1 |
| On Surface Encounter with Terrain/Water | 1 | | | | | 1 |
| Propeller Blast Or Jet Exhaust/Suction | | | | | 1 | 1 |
| Wheels Down Landing In Water | | | 1 | | | 1 |
| **Total** | 9 | 6 | 21 | 1 | 9 | 46 |

Table 28: 2003 On-Demand Part 135 Airplane Accidents by Severity and Phase of Flight

| | Takeoff or Climb | Cruise or Descent | Approach or Landing | Maneuver | Taxiing Standing | Total |
|---|---|---|---|---|---|---|
| Fatal | | 1 | 4 | 1 | 1 | 7 |
| Serious | | 1 | 1 | | | 2 |
| Minor | 4 | 1 | 5 | | | 10 |
| None | 5 | 3 | 10 | | 7 | 25 |
| Total | 9 | 6 | 20 | 1 | 8 | 44 |

In 2003, most of the initiating events for on-demand Part 135 helicopter accidents were either the result of airframe, component, or system failure or in-flight collisions with an object, terrain, or water (table 29). Most accidents occurred during cruise or descent, or during approach or landing. In contrast, on-demand Part 135 helicopter accidents that produced fatal injuries were distributed across almost all phases of flight (table 30). Only 5 of the 22 helicopter accidents were fatal, and more than half resulted in either minor injuries or no injuries. No serious-injury accidents occurred during the year.

Table 29: On-Demand Part 135 Helicopters, First Occurrences by Phase of Flight for 2003

| | Takeoff or Climb | Cruise or Descent | Approach or Landing | Maneuver or Hover | Standing | Total |
|---|---|---|---|---|---|---|
| Airframe, Component, or System Failure | 1 | 1 | 2 | | | 4 |
| Dragged Rotor, Float or Tail/Skid | | 1 | 1 | | | 2 |
| Hard Landing | | | 2 | | | 2 |
| In-flight Collision with Object | | 2 | | | | 2 |
| In-flight Collision with Terrain or Water | | 1 | | | | 1 |
| In-flight Encounter with Weather | | | | | 1 | 1 |
| Loss of Control - In-flight | 1 | | | | | 1 |
| Loss of Control - On Ground/Water | | 1 | | | | 1 |
| Loss of Engine Power (Partial) Nonmechanical | | | | | | 0 |
| Loss of Engine Power (Total) Mechanical | | | | | | 0 |
| Miscellaneous/Other | 1 | | | | | 1 |
| **Total** | 3 | 6 | 5 | 0 | 1 | 15 |

Table 30: 2003 On-Demand Part 135 Helicopter Accidents by Severity and Phase of Flight

| | Takeoff or Climb | Cruise or Descent | Approach or Landing | Maneuver Hover | Taxiing Standing | Total |
|---|---|---|---|---|---|---|
| Fatal | | 2 | 1 | 1 | 1 | 5 |
| Serious | | | | | | 0 |
| Minor | 2 | 2 | 1 | 1 | 1 | 7 |
| None | | 5 | 3 | 1 | 1 | 10 |
| | 2 | 9 | 5 | 3 | 3 | 22 |

In 2003, pilots of on-demand Part 135 accident aircraft were the most frequently cited cause or factor, as shown in table 31, followed by the environment, which was cited in more than 60% of the airplane accidents and in almost 50% of the helicopter accidents. Weather was cited in more than a quarter of all accidents, and terrain was cited as a cause or factor more often in airplane accidents than in helicopter accidents. Although aircraft-related causes or factors were cited about equally for airplane and helicopter accidents, powerplants accounted for proportionally more causes or factors in helicopter accidents than in airplane accidents. Because multiple factors in an accident are coded only once at the level of personnel, aircraft, or environment, the sum of the individual percentages may be greater than the broad cause/factor percentage.

The pattern of causes and factors for on-demand Part 135 accidents in 2003 was consistent with previous years, as shown in tables 32 and 33, although the proportions varied considerably from year to year. Pilots were the most frequently cited cause/factor for on-demand Part 135 accidents, followed by the environment. For both airplanes and helicopters, weather and terrain led the environmental category. Powerplant was the most frequently cited aircraft-related cause or factor for helicopters, while both powerplant and landing gear were cited in almost equal numbers for airplane accidents. Note that airport facilities and navigation aids were never cited as a cause or factor in helicopter accidents, but were cited in a small proportion of the airplane accidents (though not in 2003). These patterns are consistent with Part 121 data; however, aircraft-related causes/factors were cited less frequently in on-demand Part 135 accidents than in Part 121 accidents, and the recent increase in environment-related causes and factors in Part 121 accidents was not evident in on-demand Part 135 accidents.

Table 31: On-Demand Part 135 Accidents, Top Causes/Factors in 2003

| | Percent Airplane Accidents | Percent Helicopter Accidents |
|---|---|---|
| **Personnel** | 91.1% | 90.9% |
| Pilot | 80.0% | 86.4% |
| Others (aboard) | | 4.5% |
| Others (not aboard) | 15.6% | 4.5% |
| **Aircraft** | 31.1% | 36.4% |
| Powerplant/propulsion | 6.7% | 22.7% |
| Flight control systems | 2.2% | |
| Aircraft structure | 4.4% | 4.5% |
| Landing gear | 8.9% | |
| Systems and equipment | 4.4% | 13.6% |
| **Environment** | 62.2% | 45.5% |
| Weather condition | 26.7% | 27.3% |
| Terrain condition | 28.9% | 18.2% |
| Light condition | 15.6% | 4.5% |
| Object | 6.7% | 9.1% |

Table 32: On-Demand Part 135 Airplane Accidents, Top Causes/Factors, 1999-2003

| | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|
| **Personnel** | | | | | |
| Pilot | 75.0% | 80.0% | 84.3% | 80.5% | 80.0% |
| Others (aboard) | 1.8% | | | | |
| Others (not aboard) | 21.4% | 23.3% | 15.7% | 24.4% | 15.6% |
| **Aircraft** | | | | | |
| Powerplant/propulsion | 12.5% | 18.3% | 11.8% | 4.9% | 6.7% |
| Flight control systems | 1.8% | | 2.0% | | 2.2% |
| Aircraft structure | 5.4% | 3.3% | 7.8% | | 4.4% |
| Landing gear | 1.8% | 5.0% | 9.8% | 7.3% | 8.9% |
| Systems and equipment | 1.8% | 8.3% | 2.0% | 2.4% | 4.4% |
| **Environment** | | | | | |
| Weather condition | 23.2% | 36.7% | 39.2% | 31.7% | 26.7% |
| Terrain condition | 25.0% | 31.7% | 19.6% | 19.5% | 28.9% |
| Light condition | 7.1% | 15.0% | 15.7% | 14.6% | 15.6% |
| Object | 7.1% | 8.3% | 11.8% | 4.9% | 6.7% |
| Airport/airways facilities, aids | 7.1% | 11.7% | 3.9% | 4.9% | |

Table 33: On-Demand Part 135 Helicopter Accidents, Top Causes/Factors, 1999 - 2003

| | 1999 | 200 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|
| **Personnel** | | | | | |
| Pilot | 93.8% | 70.6% | 55.6% | 100.0% | 86.4% |
| Others (aboard) | | | 5.6% | | 4.5% |
| Others (not aboard) | 18.8% | 17.6% | 16.7% | 13.3% | 4.5% |
| **Aircraft** | | | | | |
| Powerplant/propulsion | | 35.3% | 22.2% | 13.3% | 22.7% |
| Flight control systems | | | 5.6% | | |
| Aircraft structure | | | 5.6% | | 4.5% |
| Landing gear | 6.3% | | 5.6% | | |
| Systems and equipment | | | 5.6% | 6.7% | 13.6% |
| **Environment** | | | | | |
| Weather condition | 43.8% | 35.3% | 22.2% | 26.7% | 27.3% |
| Terrain condition | 31.3% | 29.4% | 38.9% | 26.7% | 18.2% |
| Light condition | 18.8% | 17.6% | 5.6% | 20.0% | 4.5% |
| Object | | 17.6% | | 13.3% | 9.1% |
| Airport/airways facilities, aids | | | | | |

## Scheduled Part 135 Accidents

Scheduled Part 135 operations represent a small segment of scheduled air carrier operations, accounting for less than 2% of total air carrier flight hours in 2003. Two accidents occurred in 2003, one in Alaska and one in the Bahamas, resulting in two fatalities, one serious injury, and six minor injuries.[9]

- On July 9, 2003, the captain of a Cessna 208B airplane was seriously injured when the airplane, on a scheduled passenger/cargo flight, encountered turbulence during normal cruise flight, about 50 miles northwest of Kotzebue, Alaska. The airplane was not damaged.

- On July 13, 2003, a Cessna 402C operated by Air Sunshine, Inc., as a scheduled international flight, ditched in the Atlantic Ocean about 7 nautical miles west-northwest of Treasure Cay Airport, Treasure Cay, Great Abaco Island, Bahamas, after the in-flight failure of the right engine. Two of the nine passengers were uninjured, five passengers and the pilot sustained minor injuries, and one adult and one child sustained fatal injuries. The airplane sustained substantial damage.[10]

[9] Over half of all scheduled Part 135 operators were certificated in Alaska in 2003, which may account for the preponderance of accidents in that state. See *Aviation Safety in Alaska*, Safety Study NTSB/SS-95/03 (Washington, DC: National Transportation Safety Board, 1995).

[10] For more details see *In-Flight Engine Failure and Subsequent Ditching Air Sunshine, Inc., Flight 527, Cessna 402C, N314AB, About 7.35 Nautical Miles West-Northwest of Treasure Cay Airport, Great Abaco Island, Bahamas July 13, 2003*, Aircraft Accident Report NTSB/

Because both the number of scheduled Part 135 accidents and the number of people involved in those accidents is small each year, accident and injury data vary over the years (figure 16). Although the relatively few scheduled Part 135 accidents every year make stable patterns in the data difficult to discern, the number of scheduled Part 135 accidents and injuries declined overall from 1994 through 2003.

The Alaska accident occurred during cruise flight and turbulence was cited as the cause. The Bahamas accident occurred during descent, and the in-flight failure of the right engine, the pilot's failure to adequately manage the engine failure, and the inadequate maintenance performed by the air carrier were cited in the probable cause. Contributing to passenger fatalities was the pilot's failure to provide an emergency briefing.

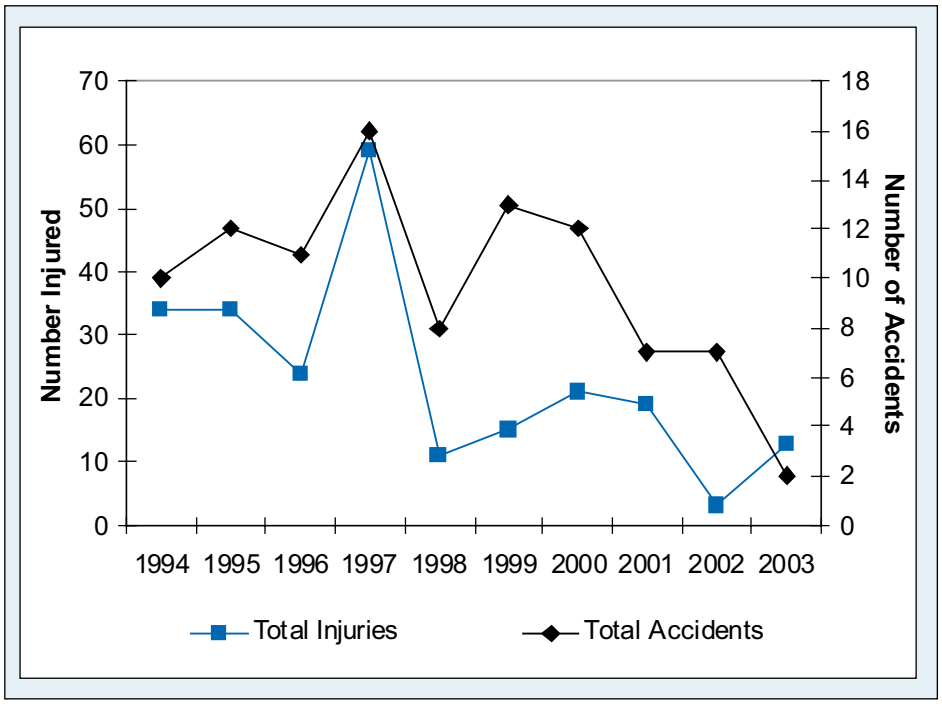


Figure 16: Scheduled Part 135 Accidents and Number People Injured, 1994 - 2003

AAR-04/03 (Washington, DC: National Transportation Safety Board, October 13, 2004).

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# Appendix A

## 2003 Air Carrier Accident Data

| Date | Registration Number | Type of Operation | Location | Operator of Aircraft | Aircraft Type | Damage to Aircraft | Highest Injury | Accident Severity | Total Fatalities | First Occurrence | Phase of Flight |
|---|---|---|---|---|---|---|---|---|---|---|---|
| January 6, 2003 | N16571 | Passenger and Cargo | Cleveland, OH | ExpressJet Airlines, DBA Continental Express | Embraer ERJ-145LR | Substantial | None | Damage | | Overrun | Landing-Roll |
| Probable Cause: The captain's failure to attain a proper touchdown on runway, and his subsequent failure to perform a go-around, both of which resulted in a runway overrun. Factors were the company's inadequate dispatch procedures with their failure to provide all NOTAM for the airport to the flight crew, and the snow covered runway. | | | | | | | | | | | |
| January 8, 2003 | N233YV | Passenger | Charlotte, NC | Air Midwest, DBA US Airways Express | Beech 1900D | Destroyed | Fatal | Major | 21 | Loss Of Control - In Flight | Takeoff |
| Probable Cause: The airplane's loss of pitch control during take-off. The loss of pitch control resulted from the incorrect rigging of the elevator system compounded by the airplane's aft center of gravity, which was substaintially aft of the certified aft limit.<br><br>Contributing to the cause of the accident were (1) Air Midwest's lack of oversight of the work being performed at the Huntington, West Virginia, maintenance station; (2) Air Midwest's maintenance procedures and documentation; (3) Air Midwest's weight and balance program at the time of the accident; (4) the Raytehon Aerospace quality assurance inspector's failure to detect the incorrect rigging of the elevator control system; (5) the Federal Aviation Administration's (FAA) average weight assumptions in its weight and balance program guidance at the time of the accident; and (6) the FAA's lack of oversight of Air Midwest's maintenance program and its weight and balance program. | | | | | | | | | | | |
| January 8, 2003 | N409QX | Passenger | Medford, OR | Horizon Air | Bombardier DHC-8-401 | Substantial | Serious | Serious | | In Flight Collision With Object | Approach - VFR Pattern - Downwind |
| Probable Cause: The fracture and spalling of the inner-most pane of the aircraft's port side windshield while on a downwind for a night visual approach due to an imposed load beyond that required for windshield certification (multiple bird strikes). Factors include a dark night, and a flock of ducks (Lesser Scaups) flying in the location of the visual traffic pattern. | | | | | | | | | | | |
| January 19, 2003 | N550NW | Passenger and Cargo | Flushing, NY | Northest Airlines | Boeing 757-251 | Substantial | Serious | Serious | | On Ground/Water Collision With Object | Standing - Engine(s) Not Operating |
| Probable Cause: Maintenance personnel failure to maintain aircraft control as a result of excessive throttle input. | | | | | | | | | | | |
| January 21, 2003 | N206EH | Passenger | Kipnuk, AK | ERA Aviation | de Havilland DHC-6-200 | Substantial | None | Damage | | Loss Of Control - On Ground/Water | Landing - Roll |
| Probable Cause: The captain's inadequate compensation for crosswind conditions, and his failure to maintain directional control during the landing roll on an icy runway, which resulted in an excursion from the runway and collision with a snow berm. Contributing factors in the accident are a crosswind, an icy runway, and a snow berm. | | | | | | | | | | | |
| February 1, 2003 | N764AS | Passenger | Vancouver, BC, Canada | Alaska Airlines | Boeing 737-400 | Substantial | None | Damage | | | |
| Probable Cause: Investigation being conducted by a foreign authority. | | | | | | | | | | | |
| February 8, 2003 | N448AM | Passenger | San Juan, PR | American Eagle | Aerospatiale ATR72-212 | None | Serious | Injury | | Miscellaneous/Other | Other |
| Probable Cause: The aft passenger stair handrail collapsing due to undetermined reasons. | | | | | | | | | | | |

| Date | Registration Number | Type of Operation | Location | Operator of Aircraft | Aircraft Type | Damage to Aircraft | Highest Injury | Accident Severity | Total Fatalities | First Occurrence | Phase of Flight |
|---|---|---|---|---|---|---|---|---|---|---|---|
| February 25, 2003 | N790AN | Passenger | Miami, FL | American Airlines | Boeing 777-223 | None | Serious | Injury | | In Flight Encounter With Weather | Descent - Normal |
| Probable Cause: The flight crew's inadvertent encounter with turbulence while attempting to maneuver through an area of convective activity during descent. | | | | | | | | | | | |
| March 1, 2003 | N642AS | Passenger | Atlanta, GA | Atlantic Southeast Airlines | Aerospatiale ATR-72-212 | None | Serious | Injury | | In Flight Encounter With Weather | Cruise |
| Probable Cause: The flight's encounter with severe turbulence that resulted in serious injury to a flight attendant. | | | | | | | | | | | |
| March 8, 2003 | N712FE | Cargo | Kinston, NC | Mountain Air Cargo | Fokker F.27MK 500 | Substantial | None | Damage | | Airframe/Component/System Failure/Malfunction | Landing - Roll |
| Probable Cause: The fatigue failure of the main drag stay tube. A factor is no inspection procedure required. | | | | | | | | | | | |
| March 19, 2003 | N216AT | Passenger | Santo Domingo, Dominican Republic | Executive Airlines, DBA American Eagle Executive | Aerospatiale ATR-42-300 | None | Serious | Injury | | | |
| Probable Cause: Investigation being conducted by a foreign authority | | | | | | | | | | | |
| March 26, 2003 | N957AT | Passenger | Flushing, NY | Air Tran Airways | Boeing 717-200 | Minor | Serious | Injury | | Airframe/Component/System Failure/Malfunction | Approach |
| Probable Cause: A failure of the left power control distribution unit (PCDU). | | | | | | | | | | | |
| April 5, 2003 | N917FR | Passenger | Pueblo, CO | Frontier Airlines | Airbus Industrie A319-111 | None | Serious | Injury | | In Flight Encounter With Weather | Climb - To Cruise |
| Probable Cause: In-flight encounter with turbulence. | | | | | | | | | | | |
| April 6, 2003 | N71411 | Passenger and Cargo | Palestine, TX | Continental Airlines | Boeing 737-924 | None | Serious | Injury | | In Flight Encounter With Weather | Cruise |
| Probable Cause: The airplane's encounter with unforecasted clear air turbulence during cruise flight. | | | | | | | | | | | |
| April 10, 2003 | N886EA | Passenger | Anchorage, AK | ERA Aviation | de Havilland DHC-6 | Substantial | None | Damage | | On Ground/Water Collision With Object | Taxi - From Landing |
| Probable Cause: The failure of the captain to maintain adequate clearance between the airplane's wingtip and a parked vehicle. A factor contributing to the accident was the failure of ground personnel to utilize a wing walker as prescribed in company policy when aircraft are operated near obstacles. | | | | | | | | | | | |
| April 16, 2003 | N452AA | Passenger | DFW Airport, TX | American Airlines | McDonnell Douglas DC-9-82 (MD-82) | None | Serious | Injury | | Airframe/Component/System Failure/Malfunction | Taxi - From Landing |
| Probable Cause: An inadvertent trauma to the passenger's ankle during an emergency evacuation. | | | | | | | | | | | |

| Date | Registration Number | Type of Operation | Location | Operator of Aircraft | Aircraft Type | Damage to Aircraft | Highest Injury | Accident Severity | Total Fatalities | First Occurrence | Phase of Flight |
|---|---|---|---|---|---|---|---|---|---|---|---|
| April 17, 2003 | N730FE | Cargo | Port Townsend, WA | Empire Airlines | Fokker F27MK 600 | Substantial | None | Damage | | Loss Of Engine Power(Partial) - Mech Failure/Malf | Cruise |
| Probable Cause: The failure of the accessory drive shaft due to deterioration of bearing number 1 in the aft fork of the universal joint for undetermined reasons during cruise flight. | | | | | | | | | | | |
| April 21, 2003 | N504UA | Passenger | Lithonia, GA | United Airlines | Boeing 757-222 | None | Serious | Injury | | In Flight Encounter With Weather | Cruise |
| Probable Cause: The flight into adverse weather encountered by the flight crew, and the flight attendant's restraint not available when she was informed to take her seat. The convective associated turbulence was a contributing factor. | | | | | | | | | | | |
| April 22, 2003 | N974DL | Passenger | Denver, CO | Delta Air Lines | McDonnell Douglas MD-88 | Substantial | Minor | Damage | | Loss Of Control - On Ground/Water | Taxi - Pushback/Tow |
| Probable Cause: The flight crew's failure to maintain aircraft control, which resulted in engine start with the throttles advanced and the subsequent impact with the tug. Contributing factors include, the flight crew's improper procedures/directives and failure to re-accomplish the before start checklist, the captain's diverted attention, the manufacturer's inadequate MEL procedures, the manufacturer's insufficiently defined conditions/steps, and the tug. | | | | | | | | | | | |
| April 24, 2003 | N427FJ | Passenger | Roanoke, VA | Atlantic Coast Airlines, DBA Delta Connection | Dornier 328-300 | None | Serious | Injury | | In Flight Encounter With Weather | Cruise - Normal |
| Probable Cause: The airplane's encounter with unforecasted clear air turbulence during cruise flight. | | | | | | | | | | | |
| May 7, 2003 | N484CA | Passenger | Boston, MA | Comair | Bombardier CL-600-2B19 | Substantial | None | Damage | | Miscellaneous/Other | Standing - Engine(s) Not Operating |
| Probable Cause: The operator's loss of control of the belt-loader while operating in the proximity of the airplane. | | | | | | | | | | | |
| May 7, 2003 | N650UA | Passenger and Cargo | New Market, VA | United Airlines | Boeing B767-300 | None | Serious | Injury | | In Flight Encounter With Weather | Descent - Normal |
| Probable Cause: The inadvertent encounter with turbulence. | | | | | | | | | | | |
| May 20, 2003 | N962AA | Passenger | Santa Ana, CA | American Airlines | Boeing 757-223 | Substantial | None | Damage | | On Ground/Water Collision With Object | Taxi - To Takeoff |
| Probable Cause: The vehicle driver's failure to deploy the parking brake or use wheel chocks to secure the vehicle prior to leaving it unattended. | | | | | | | | | | | |
| May 21, 2003 | N277MJ | Passenger | Flushing, NY | Colgan Air dba US Airways Express | Saab-Scania AB (Saab) 340B | Substantial | Minor | Damage | | Collision Between Aircraft (Other Than Midair) | Taxi - To Takeoff |
| Probable Cause: The inadequate visual lookout and inadequate crew coordination of the Dassault DA-50 flightcrew while taxiing, which resulted in an on ground collision with a taxing Saab 340B. A factor in the accident was the dark night. | | | | | | | | | | | |

| Date | Registration Number | Type of Operation | Location | Operator of Aircraft | Aircraft Type | Damage to Aircraft | Highest Injury | Accident Severity | Total Fatalities | First Occurrence | Phase of Flight |
|---|---|---|---|---|---|---|---|---|---|---|---|
| May 24, 2003 | N343SW | Passenger and Cargo | Amarillo, TX | Southwest Airlines | Boeing 737-300 | Substantial | None | Damage | | Loss Of Control - In Flight | Approach |
| Probable Cause: The flight crew's failure to align the airplane's ground track with the runway centerline before touchdown and the flight crew's failure to maintain directional control of the airplane after touchdown. Contributing to the accident was the flight crew's decision to continue the approach and to land with a thunderstorm (with associated gusty and variable winds) reported at the airport and the heavy rain, which reduced the flight crew's visibility on short final. | | | | | | | | | | | |
| June 2, 2003 | N299UX | Passenger | Denver, CO | Great Lakes Aviation | Embraer EMB-120ER | Substantial | None | Damage | | On Ground/Water Collision With Object | Taxi - From Landing |
| Probable Cause: The ground personnel's failure to maintain aircraft/ground vehicle clearance, resulting in the collision. Contributing factors include ground communications not coordinated by the ground personnel and the airport vehicle. | | | | | | | | | | | |
| June 2, 2003 | N910FR | Passenger and Cargo | Denver, CO | Frontier Airlines | Airbus Industrie A319-111 | None | Serious | Injury | | In Flight Encounter With Weather | Descent - Normal |
| Probable Cause: The inflight encounter with severe turbulence. | | | | | | | | | | | |
| June 5, 2003 | N644AW | Passenger | Payson, AZ | America West Airlines | Airbus Industrie A320-321 | None | Serious | Injury | | In Flight Encounter With Weather | Climb - To Cruise |
| Probable Cause: The flight's encounter with convectively induced turbulence associated with developing thunderstorms while the flight crew attempted to deviate around an area of adverse weather. The turbulence event occurred while the crew was attempting to maneuver around the identified primary buildup, and a secondary system that was partially masked by the primary cell visually and on radar was encountered. | | | | | | | | | | | |
| June 12, 2003 | N451AA | Passenger | Fort Worth, TX | American Airlines | Boeing MD-82 | None | Serious | Injury | | In Flight Encounter With Weather | Descent - Normal |
| Probable Cause: The encounter with severe turbulence during descent, prior to the cabin crew taking their seats, which resulted in serious injury to two flight attendants. | | | | | | | | | | | |
| June 18, 2003 | N294SK | Passenger | Taylor, FL | Chautauqua Airlines, DBA Delta Connection | Embraer EMB-145LR | None | Serious | Injury | | In Flight Encounter With Weather | Descent - Normal |
| Probable Cause: The in-flight encounter with turbulence during normal descent resulting in a serious injury to a passenger. A finding in the investigation was the seatbelt sign had been on for approximately 2 minutes at the time of the turbulence encounter. | | | | | | | | | | | |
| June 23, 2003 | N633DL | Passenger | Tampa, FL | Delta Air Lines, Inc. | Boeing 757-232 | None | Serious | Injury | | Miscellaneous/Other | Standing - Starting Engine(s) |
| Probable Cause: A torching of the right engine caused by an abnormally high flow fuel during engine start for undetermined reasons. The torching resulted in an unwarranted evacuation of the airplane and serious injuries to three passengers . A contributing factor in the accident was the failure of the flightcrew to abort the engine start due to abnormally high fuel flow indication during the right engine start. | | | | | | | | | | | |
| June 24, 2003 | N839AE | Passenger | Boston, MA | American Eagle Airlines | Embraer EMB-135-KL | Substantial | None | Damage | | On Ground/Water Collision With Object | Taxi - Pushback/Tow |
| Probable Cause: The tug driver's failure to maintain directional control of the tug, which caused the tug to impact the airplane. | | | | | | | | | | | |

| Date | Registration Number | Type of Operation | Location | Operator of Aircraft | Aircraft Type | Damage to Aircraft | Highest Injury | Accident Severity | Total Fatalities | First Occurrence | Phase of Flight |
|---|---|---|---|---|---|---|---|---|---|---|---|
| July 17, 2003 | N779UA | Passenger | Chicago, IL | United Airlines | Boeing B777-222 | None | Serious | Injury | | In Flight Encounter With Weather | Descent |
| Probable Cause: The turbulence encountered during the descent which seriously injured a passenger returning to her seat after the seat belt sign was activated. A factor was that it was not possible for the returning passenger to comply with the lit seat belt sign. | | | | | | | | | | | |
| July 22, 2003 | N504US | Passenger | Wadsworth, OH | Northwest Airlines | Boeing 757-251 | None | Serious | Injury | | In Flight Encounter With Weather | Climb - To Cruise |
| Probable Cause: An in-flight encounter with turbulence. | | | | | | | | | | | |
| August 1, 2003 | N970AT | Passenger | Atlanta, GA | Airtran Airways | Boeing 717-200 | Substantial | None | Damage | | On Ground/Water Collision With Object | Taxi - Pushback/Tow |
| Probable Cause: The failure of the ground crew to follow powerback procedures and directives. | | | | | | | | | | | |
| August 3, 2003 | N7527A | Passenger | Charlotte, NC | American Airlines | McDonnell Douglas MD-82 | None | Serious | Injury | | In Flight Encounter With Weather | Cruise - Normal |
| Probable Cause: The pilot-in-command's failure to sufficiently deviate to avoid known weather, and his failure to activate the seatbelt sign to ensure flight attendants and passengers were seated, which resulted in a passenger receiving serious injuries when the flight encountered turbulence. | | | | | | | | | | | |
| August 7, 2003 | N814ME | Passenger | Greeley, CO | Midwest Airlines | McDonnell Douglas DC-9-81 | None | Serious | Injury | | In Flight Encounter With Weather | Cruise |
| Probable Cause: The inflight encounter with severe turbulence. | | | | | | | | | | | |
| August 16, 2003 | N329TZ | Passenger | Wooster, OH | American Trans Air | Boeing 737-800 | None | Serious | Injury | | In Flight Encounter With Weather | Descent |
| Probable Cause: An inadvertent encounter with turbulence during descent. | | | | | | | | | | | |
| August 19, 2003 | N79SK | Passenger | Muskegon, MI | Skyway Airlines, DBA Midwest Connect | Beech 1900D | Substantial | None | Damage | | On Ground/Water Collision With Object | Landing - Roll |
| Probable Cause: The airplane colliding with a deer during the landing roll. | | | | | | | | | | | |
| September 2, 2003 | N413FJ | Passenger and Cargo | Hebron, KY | Atlantic Coast Airlines | Fairchild Dornier 328-300 | None | Serious | Injury | | Miscellaneous/Other | Standing - Engine(s) Not Operating |
| Probable Cause: The passenger's inadvertent fall while attempting to board. A factor was the lack of a company requirement for a person to assist passengers in boarding the airplane. | | | | | | | | | | | |
| September 2, 2003 | N454AA | Passenger and Cargo | Jamaica, NY | American Airlines | McDonnell Douglas DC-9-82 | Substantial | None | Damage | | Miscellaneous/Other | Taxi - Pushback/Tow |
| Probable Cause: A fractured nose gear spray deflector due to contact with a tow bar during pushback, which subsequently jammed and prevented nose gear extension during landing. A factor in this accident was the tow operator's failure to detect the damaged spray deflector. | | | | | | | | | | | |
| September 4, 2003 | N1450A | Passenger and Cargo | Flushing, NY | American Airlines | Fokker F.28 Mk 0100 | Substantial | None | Damage | | In Flight Collision With Object | Takeoff - Initial Climb |
| Probable Cause: An in-flight collision with birds. | | | | | | | | | | | |

| Date | Registration Number | Type of Operation | Location | Operator of Aircraft | Aircraft Type | Damage to Aircraft | Highest Injury | Accident Severity | Total Fatalities | First Occurrence | Phase of Flight |
|---|---|---|---|---|---|---|---|---|---|---|---|
| September 12, 2003 | N776NC | Passenger | Norfolk, VA | Northwest Airlines | McDonnell Douglas DC-9-51 | Minor | Fatal | Serious | 1 | Miscellaneous/Other | Standing - Engine(s) Not Operating |
| Probable Cause: the airline ground person's failure to properly control the pushback tug, and her subsequent failure to maintain adequate clearance between the tug and the airplane. Factors contributing to the accident were the airline ground person's operation of the tug without qualification or authorization, and the lack of a protective enclosure over the tug's cab. | | | | | | | | | | | |
| September 21, 2003 | N455YV | Passenger | Phoenix, AZ | Mesa Airlines, DBA America West Express | de Havilland DH-8-202 | Substantial | None | Damage | | On Ground/Water Collision With Object | Taxi - Pushback/Tow |
| Probable Cause: The ground agent's inadequate visual lookout during push back, which resulted in his failure to maintain clearance between the airplanes. | | | | | | | | | | | |
| September 27, 2003 | N733KR | Passenger | Flushing, NY | American Eagle Airlines | Embraer EMB-145 | Substantial | None | Damage | | On Ground/Water Collision With Object | Taxi - Pushback/Tow |
| Probable Cause: The inadequate visual lookout by the driver of a ground vehicle, and by ground support personnel, which resulted in a subsequent collision between the airplane and ground vehicle. A factor related to the accident was the failure of the pilot-in-command and ground personnel to coordinate ground-handling procedures. | | | | | | | | | | | |
| October 4, 2003 | N972AN | Passenger and Cargo | Boston, MA | American Airlines | Boeing 737 | Substantial | None | Damage | | On Ground/Water Collision With Object | Standing - Engine(s) Not Operating |
| Probable Cause: The collision of a ground support vehicle with a parked aircraft, due to the faulty gearshift lever on the ground support vehicle. | | | | | | | | | | | |
| October 7, 2003 | N222UA | Passenger | San Francisco, CA | United Airlines | Boeing 777-22B | Substantial | None | Damage | | On Ground/Water Collision With Object | Taxi - Pushback/Tow |
| Probable Cause: the failure of the taxiing Boeing 777's flight crew to maintain clearance from a Boeing 777 that was being pushed back from the gate. Contributing to the accident was the failure of the loca ramp controller to caution either aircrew of a possible movement conflict. | | | | | | | | | | | |
| October 16, 2003 | N764US | Passenger | Tampa, FL | U.S. Airways | Airbus Industrie A-319-112 | None | Serious | Injury | | Airframe/Component/System Failure/Malfunction | Taxi - To Takeoff |
| Probable Cause: An intermittent fault with the airplane's Brake Steering Control Unit (BSCU) for undetermined reasons, which resulted in a momentary loss of brakes and steering, and a serious injury to a flight attendant during the resultant sudden stop during taxi for takeoff. | | | | | | | | | | | |
| November 1, 2003 | N956UA | Passenger | Denver, CO | United Airlines | Boeing 737-500 | None | Serious | Injury | | In Flight Encounter With Weather | Descent |
| Probable Cause: The in-flight encounter with heavy to moderate turbulence. | | | | | | | | | | | |
| November 12, 2003 | N442XJ | Passenger | Minneapolis, MN | Mesaba Airlines | Saab-Scania Saab 340B | Substantial | None | Damage | | In Flight Collision With Object | Approach |
| Probable Cause: The in-flight collision with geese during approach. The contributing factor was the bright night conditions. | | | | | | | | | | | |
| November 14, 2003 | N178UA | Passenger | San Francisco, CA | United Airlines | Boeing 747-400 | Substantial | None | Damage | | | |

| Date | Registration Number | Type of Operation | Location | Operator of Aircraft | Aircraft Type | Damage to Aircraft | Highest Injury | Accident Severity | Total Fatalities | First Occurrence | Phase of Flight |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Probable Cause: Investigation incomplete | | | | | | | | | | | |
| December 2, 2003 | N916CA | Passenger and Cargo | Jamaica, NY | Comair | Canadair CL-600-2B19 | Substantial | None | Damage | | Miscellaneous/Other | Standing |
| Probable Cause: An encounter with an unoccupied belt loader, after the belt loader driver inadvertently fell to the ground while maneuvering. Factors in this accident were the gusty wind conditions and the failure of the operator to require that persons operating belt loaders use seat belts. | | | | | | | | | | | |
| December 14, 2003 | N445AW | Passenger | Miami, FL | Air Wisconsin Airlines | Canadair CL-600-2B19 | Substantial | None | Damage | | On Ground/Water Collision With Object | Taxi - Pushback/Tow |
| Probable Cause: The tug operator's loss of control and his failure to maintain clearance from the aircraft during pushback operations. | | | | | | | | | | | |
| December 18, 2003 | N364FE | Cargo | Memphis, TN | Federal Express | McDonnell Douglas MD-10-10F | Destroyed | Minor | Major | | Hard Landing | Landing - Flare/Touchdown |
| Probable Cause: 1) The first officer's failure to properly apply crosswind landing techniques to align the airplane with the runway centerline and to properly arrest the airplane's descent rate (flare) before the airplane touched down; and 2) the captain's failure to adequately monitor the first officer's performance and command or initiate corrective action during the final approach and landing. | | | | | | | | | | | |

| Date | Registration Number | Type of Operation | Location | Operator of Aircraft | Aircraft Type | Damage to Aircraft | Highest Injury | Total Fatalities | First Occurrence | Phase of Flight |
|---|---|---|---|---|---|---|---|---|---|---|
| July 9, 2003 | N410GV | Passenger and Cargo | Kotzebue, AK | Hageland Aviation Services | Cessna 208B | None | Serious | | In-flight Encounter with Weaher | Cruise - Normal |
| Probable Cause: The airplane encountered unforecast turbulence, which resulted in serious injury to the pilot. | | | | | | | | | | |
| July 13, 2003 | N314AB | Passenger | Treasure Cay, Bahamas | Air Sunshine, DBA Tropical Aviation Services | Cessna 402C | Substantial | Fatal | 2 | Loss of Engine Power (Total) - Mechanical | Descent - Normal |
| Probable Cause: The in-flight failure of the right engine and the pilot's failure to adequately manage the airplane's performance after the engine failed. The right engine failure resulted from inadequate maintenance that was performed by Air Sunshine's maintenance personnel during undocumented maintenance. Contributing to the passenger fatalities was the pilot's failure to provide an emergency briefing after the right engine failed. | | | | | | | | | | |

| Date | Registration Number | Type of Operation | Location | Operator of Aircraft | Category | Aircraft Type | Damage to Aircraft | Highest Injury | Total Fatalities | First Occurrence | Phase of Flight |
|---|---|---|---|---|---|---|---|---|---|---|---|
| January 9, 2003 | N22TV | Passenger | Venice, LA | Tex-Air Helicopters | Helicopter | Aerospatiale AS-350-BA | Destroyed | Minor | | Airframe/Component/System Failure/Malfunction | Descent |
| Probable Cause: The loss of tail rotor drive as a result of baggage coming in contact with the tail rotor blades after the aft cargo door was not secured. A contributing factor was the passenger's failure to follow the procedures for properly securing the helicopter's doors and latches. | | | | | | | | | | | |
| January 16, 2003 | N3194P | Passenger | B.S. 53, LA | Air Logistics LLC | Helicopter | Bell 206L-1 | Destroyed | Fatal | 1 | Loss of Control - In Flight | Approach |
| Probable Cause: The improper approach by the pilot and the settling with power encountered by the pilot. | | | | | | | | | | | |
| January 20, 2003 | N9945M | Passenger | Put In Bay, OH | Dairy Air | Airplane | Cessna 207A | Substantial | Minor | | Loss of Engine Power(Total) - Nonmechanical | Takeoff - Initial Climb |
| Probable Cause: The pilot's inadequate fuel management, which resulted in fuel starvation and a total loss of engine power during the initial climb. | | | | | | | | | | | |
| January 21, 2003 | N5740L | Passenger and Cargo | Oak Grove, LA | Air Logistics LLC | Helicopter | Bell 206L-1 | Substantial | None | | In-flight Encounter with Weather | Cruise |
| Probable Cause: The pilot's continued flight into adverse weather conditions, and his improper landing flare resulting in a hard landing. A contributing factors was the fog. | | | | | | | | | | | |
| January 23, 2003 | N6814A | Cargo | Mather, CA | Redding Aero Enterprises | Airplane | Cessna 402C | Destroyed | Serious | | | |
| Probable Cause: Investigation not complete | | | | | | | | | | | |
| January 28, 2003 | N941MA | Cargo | Cleveland, OH | Epps Air Service | Airplane | Mitsubishi MU-2B-60 | Minor | Fatal | 1 | Miscellaneous/Other | Standing - Engine(s) Operating |
| Probable Cause: The bank couriers inadequate visual lookout, as he approached an airplane with operating engines. A factor was the lack of guidance and training from the bank, for working around airplanes with operating engines. | | | | | | | | | | | |
| January 30, 2003 | N1276P | Passenger | Russian Mission, AK | Grant Aviation | Airplane | Cessna 208B | Substantial | None | | Miscellaneous/Other | Standing - Engine(s) Not Operating |
| Probable Cause: The failure of the pilot to use a tail stand while loading passengers, which resulted in the airplane's tail impacting the ground. | | | | | | | | | | | |

| Date | Registration Number | Type of Operation | Location | Operator of Aircraft | Category | Aircraft Type | Damage to Aircraft | Highest Injury | Total Fatalities | First Occurrence | Phase of Flight |
|---|---|---|---|---|---|---|---|---|---|---|---|
| February 10, 2003 | N500DX | Passenger | Paxson, AK | Delta Aviation | Helicopter | Hughes 369E | Substantial | None | | In-flight Collision with Terrain/Water | Maneuvering |
| Probable Cause: The pilot's failure to maintain altitude/clearance from terrain. A factor contributing to the accident was the pilot's attention being diverted inside the cockpit to look at the global positioning system. | | | | | | | | | | | |
| February 16, 2003 | N130CM | Cargo | Taylor Mill, KY | Kansas Air Center | Airplane | Piper PA-31-350 | Substantial | Minor | | Loss of Engine Power(Total) - Nonmechanical | Approach |
| Probable Cause: The pilot's inaccurate in-flight planning and fuel consumption calculations, and his improper decision not to land and refuel. | | | | | | | | | | | |
| February 16, 2003 | N321FL | Passenger | San Francisco, CA | Mediplane, DBA REACH | Airplane | Cessna 421C | Substantial | None | | On Ground/Water Collision with Object | Taxi - From Landing |
| Probable Cause: The vehicle driver's inadequate visual lookout and failure to follow established procedures. A contributing factor was the dark nighttime condition. | | | | | | | | | | | |
| February 16, 2003 | N407HH | Passenger and Cargo | MI 700, GM | Houston Helicopters | Helicopter | Bell 407 | Destroyed | Fatal | 2 | Loss of Engine Power(Total) - Mech Failure/Malf | Cruise |
| Probable Cause: The catastrophic failure of the engine resulting from 1st stage turbine wheel blade failure due to type 1 hot corrosion (sulfidation). Contributing factors were the pilot's failure to brief the passengers on emergency safety equipment (life raft), the pilot's failure to deploy the skid-mounted emergency float system during the autorotation, the high wind conditions, and rough sea state. | | | | | | | | | | | |
| February 22, 2003 | N740PH | Passenger | High Island 443, GM | Petroleum Helicopters | Helicopter | Bell 407 | Minor | Fatal | 1 | Loss of Control - On Ground/Water | Standing - Idling Rotors |
| Probable Cause: The pilot's failure to maintain directional control of the helicopter during the hot refueling operation which resulted in the main rotor blades striking the passenger. A contributing factor was the high wind conditions. | | | | | | | | | | | |
| March 6, 2003 | N16KH | Passenger | Alpine, TX | Bear Helicopters | Helicopter | Aerospatiale SA341G | Substantial | Minor | | Loss Of Control - In-flight | Takeoff |
| Probable Cause: The pilot's failure to maintain translational lift, which resulted in an uncontrolled descent of the helicopter during takeoff. A contributing factor was the gusty tailwind condition. | | | | | | | | | | | |

| Date | Registration Number | Type of Operation | Location | Operator of Aircraft | Category | Aircraft Type | Damage to Aircraft | Highest Injury | Total Fatalities | First Occurrence | Phase of Flight |
|---|---|---|---|---|---|---|---|---|---|---|---|
| March 16, 2003 | N431UM | Passenger | Highland, MI | CJ System Aviation Group, DBA Univ. of Michigan Survival Flight | Helicopter | Bell 430 | Substantial | None | | In-flight Collision with Object | Taxi - Aerial |
| Probable Cause: The pilot's failure to maintain clearance to the roadway sign. Contributing factors were the failure of the tail rotor gearbox, the roadway sign and the low lighting conditions (night). | | | | | | | | | | | |
| March 19, 2003 | N711TZ | Passenger | Kremmling, CO | Mountain Flight Service | Airplane | Beech E-90 | Substantial | Minor | | In-flight Collision with Terrain/Water | Approach - VFR Pattern - Downwind |
| Probable Cause: the pilot's improper in-flight planning and his failure to maintain safe clearance from the high terrain. Factors contributing to the accident were the high terrain and the dark night. | | | | | | | | | | | |
| March 24, 2003 | N501PH | Passenger | Houma, LA | Petroleum Helicopters | Helicopter | Bell 407 | Substantial | None | | Airframe/Component/System Failure/Malfunction | Cruise |
| Probable Cause: The loss of tail rotor drive and anti-torque control resulting from the fracture and separation of the #5 tail rotor drive segment due to the overtemperature and subsequent failure of the #5 hangar bearing. | | | | | | | | | | | |
| April 7, 2003 | N119PH | Passenger | Valdez, AK | Performance Helicopters | Helicopter | Aerospatiale SA-319B | Substantial | None | | Miscellaneous/Other | Landing - Flare/Touchdown |
| Probable Cause: The pilot's encounter with a ground resonance condition during the landing touchdown, which resulted in the shearing of a main rotor spacing cable bolt, and buckling of the tail boom. | | | | | | | | | | | |
| April 7, 2003 | N756WZ | Cargo | Pistol Creek, ID | SP Aircraft | Airplane | Cessna TU206 G | Substantial | Minor | | Abrupt Maneuver | Landing |
| Probable Cause: Inadequate visual lookout by the driver of the vehicle that turned on to the runway. Factors include rising terrain decreasing the possibility of a successful go-around and rough uneven terrain beyond the departure end of the runway. | | | | | | | | | | | |
| April 8, 2003 | N179GA | Cargo | St Louis, MO | Grand Aire Express | Airplane | Dassault Aviation DA-20C | Destroyed | Serious | | Loss Of Engine Power(Total) - Nonmechanical | Approach |
| Probable Cause: The pilot in command's improper in-flight decision not to divert to an alternate destination resulting in the exhaustion of the airplane's fuel supply, and his failure to relay his low fuel state to air traffic control in a timely manner. | | | | | | | | | | | |

| Date | Registration Number | Type of Operation | Location | Operator of Aircraft | Category | Aircraft Type | Damage to Aircraft | Highest Injury | Total Fatalities | First Occurrence | Phase of Flight |
|---|---|---|---|---|---|---|---|---|---|---|---|
| April 9, 2003 | N805SW | Cargo | Du Bois, PA | Sky Way Enterprises | Airplane | Short Brothers SD3-30 | Substantial | None | | Undershoot | Approach - FAF/Outer Marker To Threshold (IFR) |
| Probable Cause: The captain's failure to maintain the proper glidepath during the instrument approach, and his failure to perform a go-around. Factors were a low ceiling and reduced visibility due to mist. | | | | | | | | | | | |
| April 15, 2003 | N229AM | Cargo | Denver, CO | Superior Aviation | Airplane | Swearingen SA226TC | Substantial | None | | Airframe/Component/System Failure/Malfunction | Approach |
| Probable Cause: The failure of the landing gear system and the flight crew's failure to ascertain that the landing gear was down and locked. A contributing factor was the inadequate maintenance inspections performed by maintenance personnel. | | | | | | | | | | | |
| April 16, 2003 | N2863T | Cargo | Kotzebue, AK | SERVANT AIR | Airplane | Piper PA-32-300 | Substantial | None | | In-flight Collision with Terrain/Water | Cruise |
| Probable Cause: The pilot's failure to maintain adequate altitude/clearance, which resulted in an in-flight collision with terrain during cruise flight. Factors associated with the accident were flat light conditions, and snow-covered terrain. | | | | | | | | | | | |
| April 18, 2003 | N157CA | Cargo | Salt Lake City, UT | American Check Transport, DBA Flight Line | Airplane | Mitsubishi MU-2B-60 | Substantial | None | | On Ground/Water Collision with Object | Takeoff - Roll/Run |
| Probable Cause: the pilot improperly aligning the airplane on the runway for takeoff. Contributing factors were the reduced visibility due to rain, and the dark night. | | | | | | | | | | | |
| May 5, 2003 | N448VP | Cargo | Buffalo, NY | Northeast Aviation | Airplane | Piper PA-23-250 | Substantial | None | | Loss Of Control - In-flight | Approach - VFR Pattern - Final Approach |
| Probable Cause: The pilot's failure to maintain sufficient airspeed to prevent an inadvertent stall. Factors were the variable and gusty winds. | | | | | | | | | | | |
| May 11, 2003 | N491PH | Passenger | Gulf of Mexico, GM | Petroleum Helicopters | Helicopter | Bell 407 | Substantial | None | | Airframe/Component/System Failure/Malfunction | Cruise |
| Probable Cause: The short circuit of the C321capacitor in the Electronic Control Unit (ECU) that resulted in a single-point failure of the ECU's -15V power supply which disengaged/reverted the Hydro-mechanical Unit (HMU) from automatic to manual fuel control. Factors contributing to the accident were the pilot's attempted remedial actions in the manual mode that resulted in the engine over temperature and loss of power, and the lack of suitable terrain for the forced landing. | | | | | | | | | | | |
| May 19, 2003 | N71749 | Cargo | Wenatchee, WA | Aeroflight Executive Services | Airplane | Piper PA-31-350 | Substantial | None | | Nose Gear Collapsed | Landing - Roll |
| Probable Cause: Failure of the nose gear steering system for undetermined reasons during the landing roll. | | | | | | | | | | | |

| Date | Registration Number | Type of Operation | Location | Operator of Aircraft | Category | Aircraft Type | Damage to Aircraft | Highest Injury | Total Fatalities | First Occurrence | Phase of Flight |
|---|---|---|---|---|---|---|---|---|---|---|---|
| May 28, 2003 | N70176 | Passenger | Talkeetna, AK | McKinley Air Service | Airplane | Cessna 185 | Destroyed | Fatal | 4 | Loss of Control - In-flight | Cruise |
| Probable Cause: The pilot's failure to maintain adequate airspeed which resulted in an inadvertent stall, an uncontrolled descent and in-flight collision with terrain. A factor associated with the accident was rising terrain. | | | | | | | | | | | |
| May 29, 2003 | N7188K | Cargo | Brazos Blk 532, GM | Tarlton Helicopters | Helicopter | Robinson R44 | Destroyed | Fatal | 1 | | |
| Probable Cause: Investigation not complete | | | | | | | | | | | |
| May 30, 2003 | N60TF | Cargo | Sitka, AK | Harris Aircraft Services | Airplane | deHAVILLAND DHC-2 | Substantial | None | | Wheels Down Landing In Water | Landing - Flare/Touchdown |
| Probable Cause: The pilot's failure to retract the landing gear wheels of an amphibious float equipped airplane after departure from a paved runway, which resulted in a nose over when the airplane was landed on a nearby lake with the wheels extended. A contributing factor in the accident was the pilot's diverted attention during the short flight from the airport to the lake. | | | | | | | | | | | |
| June 9, 2003 | N5246E | Passenger | Talkeetna, AK | Talkeetna Air Taxi | Airplane | Cessna 185 | Substantial | Minor | | On Ground/Water Encounter with Terrain/Water | Takeoff - Aborted |
| Probable Cause: The pilot's excessive taxi speed while attempting to turn the airplane in soft snow, which resulted in a nose over. A factor in the accident was soft snow. | | | | | | | | | | | |
| June 11, 2003 | N217ES | Passenger | Madison, FL | C J Systems Aviation Group | Helicopter | Aerospatiale AS355F1 | Substantial | Minor | | Dragged Wing,Rotor,Pod,Float Or Tail/Skid | Takeoff |
| Probable Cause: The pilot in command's diverted attention and loss of control while attempting to takeoff, which resulted in the main rotor blades being dragged, and the helicopter rolling over. | | | | | | | | | | | |
| June 15, 2003 | N4493M | Passenger | Volcano, HI | K & S Helicopters, DBA Paradise Helicopters | Helicopter | McDonnell Douglas 369D | Destroyed | Fatal | 4 | | |
| Probable Cause: Investigation not complete. | | | | | | | | | | | |
| June 17, 2003 | N3748C | Passenger and Cargo | LittleWhale Cay, Bahamas | Execstar Aviation | Airplane | Cessna 402B | Substantial | None | | | |
| Probable Cause: Investigation being conducted by a foreign authority | | | | | | | | | | | |

| Date | Registration Number | Type of Operation | Location | Operator of Aircraft | Category | Aircraft Type | Damage to Aircraft | Highest Injury | Total Fatalities | First Occurrence | Phase of Flight |
|---|---|---|---|---|---|---|---|---|---|---|---|
| June 17, 2003 | N685BW | Cargo | Fort Mill, SC | Package Express | Airplane | Piper PA-32-300 | Substantial | Minor | | Loss Of Engine Power(Total) - Nonmechanical | Approach |
| Probable Cause: The pilot's mismanagement of the fuel supply, which resulted in fuel starvation and the subsequent loss of engine power. | | | | | | | | | | | |
| June 25, 2003 | N91303 | Passenger | Anchor Point, AK | Hallo Bay Air | Airplane | Cessna 180 | Destroyed | Fatal | 3 | In-flight Collision with Terrain/Water | Unknown |
| Probable Cause: An in-flight collision with water for an undetermined reason. | | | | | | | | | | | |
| June 28, 2003 | N512FS | Passenger | Good News, AK | F S Air Service | Airplane | Swearingen SA-226T | Substantial | Minor | | Undershoot | Approach - VFR Pattern - Final Approach |
| Probable Cause: The flight crew's inadequate evaluation of the weather conditions, which resulted in their inadequate compensation for the wind conditions, and subsequent undershoot. A contributing factor in the accident was a downdraft. | | | | | | | | | | | |
| July 5, 2003 | N2273A | Passenger | Temple Bar, AZ | Sundance Helicopters | Helicopter | American Eurocopter AS350BA | Substantial | Minor | | Airframe/Component/System Failure/Malfunction | Cruise |
| Probable Cause: The pilot's failure to follow the published electrical system emergency procedures for a hot battery, and his misjudged landing flare during the terminal phase of the autorotation maneuver at low level. | | | | | | | | | | | |
| July 7, 2003 | N147BH | Passenger | Ship Shoal 80, GM | Texair Helicopters | Helicopter | Aerospatiale AS350BA | Substantial | None | | In-flight Collision with Object | Landing |
| Probable Cause: The pilot's failure to maintain clearance with the safety fence while landing on an off-shore helipad. | | | | | | | | | | | |
| July 7, 2003 | N98635 | Cargo | Lakeview, OR | Ameriflight | Airplane | Cessna 402 B | Substantial | None | | Main Gear Collapsed | Taxi - To Takeoff |
| Probable Cause: Failure of the landing gear shaft roll pin resulting in a main gear collapse during the taxi phase of operation. | | | | | | | | | | | |
| July 11, 2003 | N505SD | Cargo | English Bay, AK | Smokey Bay Air | Airplane | Cessna 206 | Substantial | Fatal | 1 | Loss of Control - In-flight | Landing - Aborted |
| Probable Cause: The pilot's failure to maintain adequate airspeed during an aborted landing, resulting in an inadvertent stall and subsequent collision with water. Factors were the high velocity crosswind conditions, the pilot's inadequate compensation for the wind conditions, and his delay in aborting the landing. | | | | | | | | | | | |

| Date | Registration Number | Type of Operation | Location | Operator of Aircraft | Category | Aircraft Type | Damage to Aircraft | Highest Injury | Total Fatalities | First Occurrence | Phase of Flight |
|---|---|---|---|---|---|---|---|---|---|---|---|
| July 20, 2003 | N155RR | Passenger | Hampton Bays, NY | Air Hamptons | Airplane | Cessna T210N | Destroyed | Minor | | Loss of Engine Power | Cruise |
| Probable Cause: A loss of engine power for undetermined reasons. A factor was the lack of suitable terrain for the forced landing. | | | | | | | | | | | |
| July 21, 2003 | N1091S | Passenger | Ketchikan, AK | Temsco Helicopters | Helicopter | Hughes 369D | Substantial | Minor | | Loss of Engine Power(Partial) - Nonmechanical | Maneuvering |
| Probable Cause: The improper installation of a bolt in the gas generator governor linkage by company maintenance personnel, which resulted in a loss of the bolt, a loss of engine power while maneuvering, and subsequent forced landing and collision with trees. Factors contributing to the accident were an inadequate preflight inspection by the pilot, and an uncommanded surge in engine power. | | | | | | | | | | | |
| July 23, 2003 | N37741 | Passenger | Waialeale,Kauai, HI | Jack Harter Helicopters | Helicopter | Bell 206B | Destroyed | Fatal | 5 | | |
| Probable Cause: Investigation not complete | | | | | | | | | | | |
| July 31, 2003 | N29CF | Passenger | Anchorage, AK | Spernak Airways | Airplane | Cessna 207 | Substantial | Serious | | Loss of Engine Power(Total) - Nonmechanical | Cruise |
| Probable Cause: The pilot's incorrect positioning of the fuel tank selector valve to a nearly empty tank, which resulted in a loss of engine power due to fuel starvation, and subsequent emergency landing at an off-airport site. Factors associated with the accident were the pilot's inadequate preflight inspection, and his inadequate remedial action. | | | | | | | | | | | |
| August 8, 2003 | N6439H | Cargo | Bethel, AK | Hageland Aviation | Airplane | Cessna 207A | Substantial | None | | Loss of Engine Power(Total) - Mech Failure/Malf | Cruise |
| Probable Cause: A complete loss of engine power during cruise flight due to the shifting of a main crankshaft bearing that produced a fatigue failure of the crankshaft. A factor contributing to the accident was unsuitable terrain for a forced landing, which resulted in a nose over. | | | | | | | | | | | |
| August 13, 2003 | N41128 | Passenger | E.I. 276, LA | Petrolium Helicopters | Helicopter | Bell 206L-3 | Substantial | Fatal | 3 | | |
| Probablel Cause: Investigation not complete | | | | | | | | | | | |
| August 13, 2003 | N59352 | Passenger | Ketchikan, AK | Seawind Aviation | Airplane | Cessna 206 | Substantial | None | | In-flight Collision with Terrain/Water | Takeoff - Roll/Run |
| Probable Cause: The pilot's selection of an unsuitable takeoff area, which resulted in an in-flight collision with ocean waves. A factor associated with the accident was large waves/swells. | | | | | | | | | | | |

| Date | Registration Number | Type of Operation | Location | Operator of Aircraft | Category | Aircraft Type | Damage to Aircraft | Highest Injury | Total Fatalities | First Occurrence | Phase of Flight |
|---|---|---|---|---|---|---|---|---|---|---|---|
| August 17, 2003 | N6591L | Cargo | Barrow, AK | Hagelend Aviation Services | Airplane | Reims Aviation 406 | Substantial | Fatal | 2 | In-flight Collision with Terrain/Water | Maneuvering |
| Probable Cause: An in-flight collision with ocean waters while maneuvering for an undetermined reason. | | | | | | | | | | | |
| September 5, 2003 | N206J | Passenger | Kaktovik, AK | MAA, DBA Alaska Flyers | Airplane | Cessna 206 | Substantial | None | | Loss of Control - In-flight | Takeoff - Initial Climb |
| Probable Cause: The pilot's failure to maintain airspeed during takeoff which resulted in a loss of control during initial climb. Factors associated with the accident were wet and muddy runway conditions, and the pilot's selection of an unsuitable takeoff area. | | | | | | | | | | | |
| September 9, 2003 | N5206J | Passenger | Hilo, HI | Sunshine Helicopters | Helicopter | Eurocopter France AS 350 BA | Substantial | None | | In-flight Encounter with Weather | Cruise |
| Probable Cause: The pilot's inadvertent encounter with instrument meteorological conditions and his failure to maintain aircraft control. Contributing factors were fog, rough/uneven terrain, and spatial disorientation. | | | | | | | | | | | |
| September 10, 2003 | N710MH | Passenger | Chalkyitsik, AK | Circle Air | Airplane | Cessna 206 | Substantial | Minor | | In-flight Collision with Terrain/Water | Takeoff - Initial Climb |
| Probable Cause: The pilot's inadequate compensation for wind conditions, and his failure to maintain adequate airspeed during takeoff, which resulted in an in-flight collision with brush, and subsequent stall of the airplane. Factors associated with the accident were a crosswind, high vegetation (brush), and an inadvertent stall. | | | | | | | | | | | |
| September 12, 2003 | N12HT | Passenger | Galveston 395, GM | Go-Helitrans | Helicopter | Bell 206-B3 | Destroyed | Minor | | Loss of Control - On Ground/Water | Standing |
| Probable Cause: The reason for loss of control was undetermined. | | | | | | | | | | | |
| September 20, 2003 | N74AE | Passenger | Shoals, IN | Air EVAC EMS | Helicopter | Bell 206L-1 | Substantial | None | | Hard Landing | Landing - Flare/Touchdown |
| Probable Cause: The pilot not maintaining a proper descent rate during the touchdown once visual reference was reduced by the dust in the rotor downwash. Factors were the dusty gravel landing area and the pilot's visual lookout not being possible due to the dust the rotor downwash raised. | | | | | | | | | | | |
| September 20, 2003 | N270SH | Passenger | GrandCanyon West, AZ | Sundance Helicopters | Helicopter | Aerospatiale AS350BA | Destroyed | Fatal | 7 | | |
| Probable Cause: Investigation not complete | | | | | | | | | | | |

| Date | Registration Number | Type of Operation | Location | Operator of Aircraft | Category | Aircraft Type | Damage to Aircraft | Highest Injury | Total Fatalities | First Occurrence | Phase of Flight |
|---|---|---|---|---|---|---|---|---|---|---|---|
| September 23, 2003 | N405BK | Cargo | Nantucket, MA | Island Airlines | Airplane | Cessna 402C | Substantial | Fatal | 1 | Loss Of Control - In Flight | Missed Approach (IFR) |
| Probable Cause: The pilot's failure to maintain aircraft control during a missed approach. Factors in this accident were fog and the night light conditions. | | | | | | | | | | | |
| October 10, 2003 | N81671 | Passenger and Cargo | W. Cameron 509, GM | Petroleum Helicopters | Helicopter | Bell 206L-3 | Destroyed | Fatal | 3 | In-flight Encounter with Weather | Maneuvering |
| Probable Cause: The pilot's loss of control following an inadvertent encounter with adverse weather conditions. Contributing factors were the prevailing thunderstorms, the low ceilings, and the miscommunication between the pilot and the company's communication center in obtaining in-flight weather advisories, including aircraft location. | | | | | | | | | | | |
| October 15, 2003 | N25496 | Cargo | Davenport, IA | Carver Aero | Airplane | Beech A36 | Substantial | None | | Loss of Engine Power(Total) - Mech Failure/Malf | Climb - To Cruise |
| Probable Cause: A loss of engine power due to fuel starvation as a result of the improper installation of the fuel nozzle. Also causal was the engine manufacturer's improper installation instructions for the nozzle pressure port plug on the fuel manifold valve. A factor associated with the accident was the corn crop which was contacted during the forced landing. | | | | | | | | | | | |
| October 29, 2003 | N791FE | Cargo | Cody, WY | Corporate Air, DBA Federal Express | Airplane | Cessna 208B | Substantial | Fatal | 1 | Loss of Control - In Flight | Approach - Circling (IFR) |
| Probable Cause: The pilot's failure to maintain aircraft control. Contributing factors include the pilot's failure to divert to an alternate airport, an inadvertent stall, and the snow and icing conditions. | | | | | | | | | | | |
| November 1, 2003 | N787KL | Cargo | Rawlins, WY | Key Lime Air | Airplane | Fairchild Swearingen SA227BC | Substantial | None | | Loss of Control - On Ground/Water | Landing - Roll |
| Probable Cause: The pilot's failure to maintain directional control during the landing roll. Contributing factors include the pilot's improper in-flight planning/decision, the icy, snow covered runway and the snow bank. | | | | | | | | | | | |
| November 3, 2003 | N820NA | Passenger | Mesa, AZ | Native American Air Ambulance | Helicopter | Eurocopter AS350 B3 | Substantial | None | | Airframe/Component/System Failure/Malfunction | Cruise |
| Probable Cause: The pilot's inadvertent activation of the hydraulic test switch, which resulted in a loss of the hydraulic system pressure, and his failure to maintain directional control. | | | | | | | | | | | |
| November 11, 2003 | N789CN | Passenger | Wheeling, IL | West Coast Charters | Airplane | Cessna 560XL | Substantial | None | | Airframe/Component/System Failure/Malfunction | Taxi - To Takeoff |
| Probable Cause: The flight crew's intentional operation with know deficiencies in the aircraft and their delay in aborting the takeoff when a no-takeoff warning was presented. An additional cause was the crew's failure to comply with flight manual procedures concerning stabilizer miscompare and no-takeoff indications. Contributing factors were the inoperative two-position horizontal stabilizer system due to the intermittent electrical connection at the aft fairing connector, as well as the runway approach lights impacted during the overrun. | | | | | | | | | | | |

| Date | Registration Number | Type of Operation | Location | Operator of Aircraft | Category | Aircraft Type | Damage to Aircraft | Highest Injury | Total Fatalities | First Occurrence | Phase of Flight |
|---|---|---|---|---|---|---|---|---|---|---|---|
| November 12, 2003 | N77JL | Passenger and Cargo | Belleville, IL | Multi-Aero | Airplane | Learjet 24D | Destroyed | Minor | | Loss of Engine Power | Takeoff - Initial Climb |
| Probable Cause: The total loss of power to the right engine and the partial loss of power to the left engine after the airplane encountered a flock of birds during initial climb out, resulting in impeded ram induction airflow. | | | | | | | | | | | |
| November 13, 2003 | N717BT | Cargo | Phoenix, AZ | Baltimore Air Transport, Inc./CorpJet | Airplane | Cessna 208B | Substantial | None | | Propeller Blast Or Jet Exhaust/Suction | Taxi - To Takeoff |
| Probable Cause: The pilot's improper decision to taxi behind another airplane conducting an engine run-up, which resulted in a jet blast encounter. | | | | | | | | | | | |
| November 18, 2003 | N332BA | Cargo | Grand Junction, CO | Key Lime Air | Airplane | Fairchild Swearingen SA226TC | Substantial | None | | Nose Gear Collapsed | Landing - Roll |
| Probable Cause: The operator's improper maintenance and servicing of the airplane's nose landing gear assembly, resulting in the collapse of the nose landing gear during the landing roll. Contributing factors include the nose section of the airplane's subsequent contact with the runway, the impact of several fractured propeller pieces into the fuselage, and the operator's inadequate maintenance and servicing procedures. | | | | | | | | | | | |
| November 24, 2003 | N112AX | Cargo | Juneau, AK | Alaska Central Express | Airplane | Beech 1900C | Substantial | None | | In-flight Collision With Object | Approach - FAF/Outer Marker To Threshold (IFR) |
| Probable Cause: The pilot's failure to maintain altitude/clearance from obstacles when approaching the airport, which resulted in an in-flight collision with a tree. Factors associated with the accident were the dark night, snow showers, and the pilot's failure to maintain runway alignment. | | | | | | | | | | | |
| November 29, 2003 | N13VF | Passenger | Kodiak, AK | Andrew Airways | Airplane | deHavilland DHC-2 | Substantial | None | | In-flight Encounter with Weather | Approach - VFR Pattern - Final Approach |
| Probable Cause: The pilot's inadequate evaluation of the weather conditions, and his failure to maintain adequate altitude/clearance, which resulted in a collision with terrain during the final landing approach. A factor contributing to the accident was the presence of a downdraft. | | | | | | | | | | | |
| November 29, 2003 | N439AF | Cargo | Spokane, WA | Ameriflight | Airplane | Fairchild Swearingen SA227-AT | Destroyed | Fatal | 1 | In-flight Collision with Object | Approach - FAF/Outer Marker To Threshold (IFR) |
| Probable Cause: The pilot-in-command's failure to maintain proper glidepath alignment during an ILS approach in poor weather resulting in collision with trees and terrain. Contributing factors were the unreliable status of the primary (NAV 1) ILS receiver (leaving the pilot with only the secondary (NAV 2) ILS receiver), the low ceilings and trees. | | | | | | | | | | | |
| December 1, 2003 | N457PH | Cargo | High Island 573, GM | Petroleum Helicopters | Helicopter | Bell 407 | Destroyed | Fatal | 1 | Loss of Engine Power(Total) - Mech Failure/Malf | Cruise |
| Probable Cause: The loss of engine power due to the failure of the 3rd stage turbine wheel and subsequent catastrophic failure of the turbine assembly. | | | | | | | | | | | |

| Date | Registration Number | Type of Operation | Location | Operator of Aircraft | Category | Aircraft Type | Damage to Aircraft | Highest Injury | Total Fatalities | First Occurrence | Phase of Flight |
|---|---|---|---|---|---|---|---|---|---|---|---|
| December 3, 2003 | N340AE | Cargo | Denver, CO | Key Lime | Airplane | Swearingen SA227-AC | Substantial | None | | Collision Between Aircraft (Other Than Midair) | Taxi - To Takeoff |
| Probable Cause: The failure of the pilot of the taxiing aircraft to maintain clearance and adequate visual lookout for the stopped aircraft. | | | | | | | | | | | |
| December 3, 2003 | N60U | Cargo | Denver, CO | Key Lime | Airplane | Swearingen SA226-TC | Substantial | None | | Collision Between Aircraft (Other Than Midair) | Taxi - To Takeoff |
| Probable Cause: The failure of the pilot of the taxiing aircraft to maintain clearance and adequate visual lookout for the stopped aircraft. | | | | | | | | | | | |
| December 11, 2003 | N40259 | Cargo | Buffalo, NY | Northeast Aviation | Airplane | Piper PA-23-250 | Substantial | None | | Fire | Taxi - From Landing |
| Probable Cause: The pilot's improper procedure with regard to the cabin heater, which resulted in the over temperature of the heater and subsequent fire. | | | | | | | | | | | |
| December 12, 2003 | N3983W | Cargo | Larson Bay, AK | Island Air Service | Airplane | Piper PA-32-260 | Substantial | None | | In-flight Encounter with Weather | Cruise |
| Probable Cause: The loss of engine power for an unknown reason while maneuvering, which resulted in the pilot ditching the airplane. Factors contributing to the accident were a low ceiling and a snow squall. | | | | | | | | | | | |
| December 16, 2003 | N399CZ | Cargo | Mosinee, WI | Freight Runners | Airplane | Beech 99 | Substantial | None | | Hard Landing | Landing |
| Probable Cause: The pilot's failure to maintain the proper descent rate and his inadequate flare. | | | | | | | | | | | |
| December 20, 2003 | N9469B | Cargo | Covington, KY | Martinaire | Airplane | Cessna 208B | Substantial | None | | Loss of Control - In-flight | Takeoff |
| Probable Cause: The pilot's inadequate pre-flight inspection, which resulted in a decrease in airplane performance due to ice, and a subsequent hard landing. | | | | | | | | | | | |
| December 22, 2003 | N598S | Cargo | Ypsilanti, MI | McMahon Helicopter Service | Helicopter | Sikorsky S-58JT | Destroyed | Minor | | In-flight Collision with Object | Landing |
| Probable Cause: The pilot became disoriented and attempted to land the helicopter at the wrong ramp resulting in his failure to maintain obstacle clearance during the approach. The light poles were a factor to the accident. | | | | | | | | | | | |

# APPENDIX B

## Definitions of Terms Used in the Review

### *Air Carrier Operations*

Air carriers are generally defined as operators that fly aircraft in revenue service. The *Review of 2003 Aircraft Accident Data: U.S. Air Carrier Operations* covers accidents involving aircraft operated by U.S. air carriers under Title 14[1] Parts 121 and 135 of the *Code of Federal Regulations* (CFR). This review does not discuss general aviation aircraft,[2] foreign-operated aircraft, ultralight vehicles, experimental aircraft, and commercial space launches.

### *Part 121 Operations*

Part 121 operations are any scheduled or non-scheduled passenger-carrying operations that adhere to regulations that limit operations to controlled airspace and controlled airports for which specific weather, navigational, operational, and maintenance support are available. These operations usually include operators that fly large transport-category aircraft. An operation is scheduled if an air carrier or operator offers in advance the departure location, departure time, and arrival location.[3] As a result, "Part 121" typically applies to major airlines and cargo carriers that fly large transport-category aircraft serving large airports. The operating rules for scheduled and nonscheduled Part 121 operators are generally the same.

### *Part 135 Operations*

Part 135 operations must adhere to requirements that are similar to those of Part 121 operations (with some notable differences with respect to aircraft and airport characteristics, and to crew training and experience). However, Part 135 operations are allowed to service routes to smaller airports that do not have the weather, communications, and navigational capabilities required of the larger airports serving Part 121 operations. Part 135 typically applies to commercial carriers flying smaller jet and turboprop aircraft commonly referred to as commuter airlines (*scheduled* Part 135) and air taxis (*on-demand* Part 135).

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[1] Title 14 is also known as the *Federal Aviation Regulations* (FAR).

[2] A separate review, published annually by the Safety Board, summarizes accident statistics for these aircraft.

[3] Title 14 *Code of Federal Regulations* (CFR) Part 119.3.

In March 1997, the regulations defining Part 121 operations changed to include scheduled aircraft with more than 10 seats. Previously, scheduled aircraft with fewer than 30 passenger seats were operated under Part 135. As a result, after 1997, most carriers once popularly known as "commuters" began operating as Part 121 flights.

### *Scheduled Part 135 Operations*

According to 14 CFR Part 119.3, a *scheduled* operation is any "passenger-carrying operation for compensation or hire conducted by an air carrier or commercial operator for which the certificate holder or its representative offers in advance the departure location, departure time, and arrival location." Scheduled Part 135 carriers typically fly aircraft with single/twin turbine engines or single/twin piston engines. Such carriers are more likely to fly short routes and are concentrated for the most part in Alaska.

### *On-Demand Part 135 Operations*

An *on-demand* Part 135 operation is any operation for compensation or hire for which the departure location, departure time, and arrival location are negotiated with the customer. Customers can charter an entire aircraft or book a single seat on an air taxi. According to the FAA, on-demand Part 135 operators number about 3,000; of those, approximately 2,500 offer service in airplanes and 500 offer service in helicopters.[4] On-demand Part 135 air carriers are typically characterized as offering one of three types of service: air taxi or charter; air tour; or air medical. Historically, on-demand Part 135 operations represent about half of the air carrier fleet and account for about 15% of all air carrier flight hours.

[4] Accurate data for on-demand Part 135 operators and aircraft are difficult to obtain. The figures cited in this review are from *Chartering an Aircraft: A Consumer Guide* (Washington, DC: Federal Aviation Administration, Office of Public Affairs). The 2003 *General Aviation and Air Taxi Activity (GAATA) Survey* shows a total of about 3,000 air taxi and air tour aircraft (not separated into airplanes and helicopters) in Table GA 00 1.1.

Its *on-demand* nature is the important characteristic of this type of operation. On-demand Part 135 operators offer charter or air taxi flights on a flexible schedule and carry passengers or cargo (and in some cases, both) to a variety of airports that are not usually serviced by scheduled airlines.[5] An on-demand operation can serve corporate customers who need a flexible schedule but do not wish to support their own corporate flight department. On-demand Part 135 operations also include medical evacuation flights when a patient is on board the aircraft and helicopter flights serving offshore drilling platforms in the Gulf of Mexico. On-demand Part 135 operations are evenly distributed throughout the United States and include both short and long routes that serve the specific needs of charter and air taxi customers. On-demand Part 135 aircraft range from single-engine piston aircraft to large corporate jets that are typically smaller than those used in Part 121 operations.

## Safety Board Severity Classification of Part 121 Accidents

Since 1997, the Safety Board has used a classification system for Part 121 and other air carrier accidents based on accident severity. Developed in response to a congressional requirement,[6] the system uses classifications that characterize both injury and damage. Definitions for level of injury and level of damage in Part 121 accidents are the same as those used to classify Part 135 accidents. The definitions of Safety Board Severity Classifications for Part 121 accidents are provided below:

**Major** An accident in which at least one of the conditions is met:

- Part 121 aircraft was destroyed, or
- there were multiple fatalities, or
- there was one fatality and a Part 121 aircraft was substantially damaged.

[5] FARs restrict on-demand Part 135 operations to passenger-carrying operations conducted as a public charter; scheduled passenger-carrying operations of less than five round trips per week on at least one route between two or more points according to the published flight schedules; and all-cargo operations conducted with airplanes having a payload capacity of 7,500 pounds or less, or with rotorcraft. A final rule change to the FARs effective November 17, 2003 (*Federal Register*, vol. 68, no. 180, September 17, 2003, pp. 54520-54588), concerning fractional ownership programs (which heretofore operated under Part 91) may significantly affect on-demand Part 135 operations. The rule change may require some fractional ownership programs to operate as if they were certified as on-demand Part 135.

[6] The classification system was introduced in 1997 as a requirement of the FAA Reauthorization Act of 1996 (and put into effect by Public Law 104-264, Sec. 407; amendment to *United States Code*, Title 49, Subtitle II, Chapter 11, Section 1119) for the Safety Board to provide "clearer descriptions of accidents associated with air transportation, including a more refined classification of accidents which involve fatalities, injuries, or substantial damage and which are only related to the operation of an aircraft." Before 1997, accident severity was characterized in terms of injuries (fatal, serious, minor, or none) or aircraft damage (destroyed, substantial, minor, or none).

**Serious** An accident in which at least one of the conditions is met:

- there was one fatality without substantial damage to a Part 121 aircraft, or
- there was at least one serious injury and a Part 121 aircraft was substantially damaged.

**Injury** A nonfatal accident with at least one serious injury and without substantial damage to an aircraft.

**Damage** An accident in which no person was killed or seriously injured, but in which any aircraft was substantially damaged.

## Safety Board Classification of Part 135 Accidents

Like Part 121 accidents, Part 135 accidents (both scheduled and on-demand) are classified by highest *level of injury* (fatal, serious, minor, or none) and *level of aircraft damage* (destroyed, substantial, minor, or none), as summarized below.

## Definitions for Level of Injury

**Fatal** Any injury that results in death within 30 days of the accident.

**Serious** Any injury which:

(1) requires hospitalization for more than 48 hours, commencing within 7 days from the date the injury was received;

(2) results in a fracture of any bone (except simple fractures of fingers, toes, or nose);

(3) causes severe hemorrhages, nerve, muscle, or tendon damage;

(4) involves any internal organ; or

(5) involves second- or third-degree burns, or any burns affecting more than 5% of the body surface.

**Minor** Any injury that is neither fatal nor serious.

**None** No injury.

## Definitions for Level of Aircraft Damage

**Destroyed** Damage due to impact, fire, or in-flight failures to an extent not economically repairable.

**Substantial** Damage or failure which adversely affects the structural strength, performance, or flight characteristics of the aircraft, and which would normally require major repair or replacement of the affected component. Engine failure or damage limited to an engine if only one engine fails or is damaged, bent fairings or cowling, dented skin, small puncture holes in the skin or fabric, ground damage to rotor or propeller blades, and damage to landing gear, wheels, tires, flaps, engine accessories, brakes, or wingtips are not considered "substantial damage" for the purpose of this part.[7]

**Minor** Any damage that neither destroys the aircraft nor causes substantial damage.

**None** No damage.

[7] See 49 CFR 830.2. On December 27, 2004, the Safety Board published in the Federal Register a proposal to change 49 CFR 830.2 to include reporting of certain events that are not currently covered by the regulation. In the proposed change, reference to ground damage to helicopter rotor blades would be removed from the list of exclusions. If adopted, the change would bring events involving ground damage to main or tail rotor blades within the definition of an accident and make them reportable events. For more detail, see Notice of Proposed Rulemaking, "Notification and Reporting of Aircraft Accidents and Incidents and Overdue Aircraft, and Preservation of Aircraft Wreckage, Mail, Cargo, and Records," Federal Register, Vol. 69, No. 247, December 27, 2004.

# APPENDIX C

## How Accident Data in the Review Are Collected and Analyzed

National Transportation Safety Board aircraft accident data reviews present accident data in two ways: by the number of accidents and by accident rate. For Part 121 and scheduled Part 135 operations, accident rates are calculated using three flight activity measures: flight hours, departures, and miles flown. Appendix C describes the data collection process, how those data are coded, and how the flight activity measures are compiled and used to calculate accident rates.

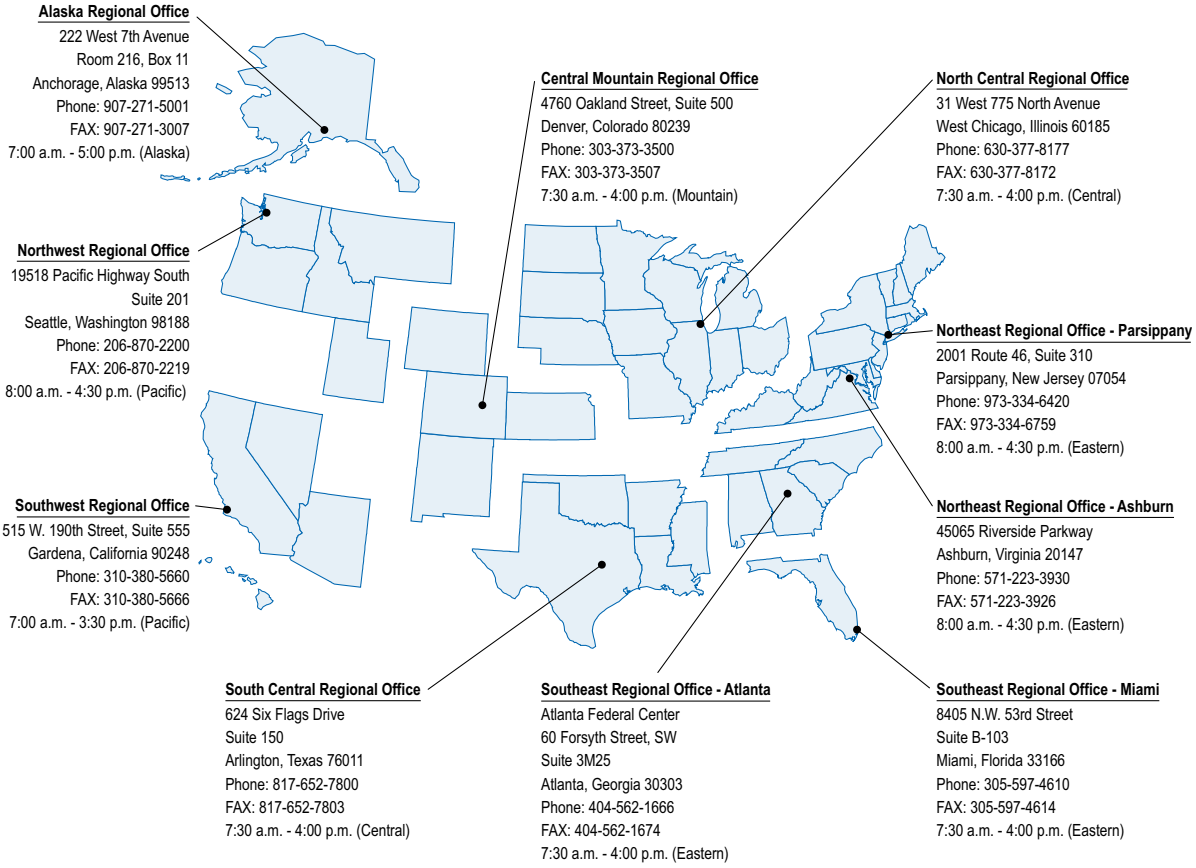
## Accident Data: The Safety Board's Investigative Process

The Safety Board investigates every civil aviation accident that occurs in the United States. It also provides investigators to serve as U.S. Accredited Representatives, as specified in international treaties and agreements, for aviation accidents that occur overseas and that involve aircraft registered in the U.S. or aircraft or major components of U.S. manufacture.[1] Investigations are conducted by Safety Board Headquarters staff based in Washington, D.C., or by staff based in one of the regional offices.

Although the Safety Board investigates all civil aviation accidents that occur on U.S. soil (including those involving domestic and foreign operators), the *Review of 2003 Aircraft Accident Data: U.S. Air Carrier Operations* describes accidents that occur among U.S.-operated aircraft in all parts of the world.

[1] For more detailed information about the criteria for Safety Board investigation of an aviation accident or incident, see Title 49 *Code of Federal Regulations* (CFR) 831.2.

## NATIONAL TRANSPORTATION SAFETY BOARD REGIONAL OFFICES




## The Safety Board's Aviation Accident/Incident Database

The Safety Board maintains the Accident/Incident Database, the government's official repository of aviation accident data and causal factors for civil aviation accidents. The database was established in 1962 by the Safety Board's predecessor agency, the Civil Aeronautics Board, and approximately 1,900 new event records are added each year. Each record contains data about the aircraft, environment, injuries, sequence of accident events, and other topics. The database is available to the public at <ftp://www.ntsb.gov/avdata/>. A database query tool is also available at <http://www.ntsb.gov/ntsb/query.asp#query_start> to search for sets of accidents using such information as date, location, and category of aircraft.

The Safety Board's database is primarily composed of aircraft accidents. An "accident" is defined in 49 CFR Part 830.2 as—

> an occurrence associated with the operation of an aircraft which takes place between the time any person boards the aircraft with the intention of flight and all such persons have disembarked, and in which any person suffers death or serious injury, or in which the aircraft receives substantial damage.[2]

[2] The definitions of a "death" (fatality), "serious injury," or "substantial damage" are presented in appendix B.

The database also contains fields for documenting selected aviation "incidents," defined in 49 CFR Part 830.2 as "an occurrence other than an accident, associated with the operation of an aircraft, which affects or could affect the safety of operations."

During an investigation, Safety Board investigators collect information from a variety of sources, including the aircraft crew, the FAA, manufacturers, and witnesses. Investigators use the Board's Accident Data Management System (ADMS) to document those data in the Accident/Incident Database. There are five types of data in the database:

- Factual information that documents the accident situation.
- Occurrence codes to document what happened during an accident.
- Phase-of-flight codes to designate when each occurrence took place.
- Explanatory causes, factors, and findings to identify the cause-and-effect relationships that help explain why the accident happened.
- Narrative data that describe the accident in natural language and state the probable cause of the accident.

**Factual Information.** Investigators enter information in the database that describes the accident aircraft, crew and passengers, and accident environment. These data typically include aircraft type, make and model, aviation-related demography of flight and cabin crew, weather conditions, and accident site details.

**Occurrence Data.** The circumstances of an accident are documented in the Safety Board's accident report as accident "occurrences" within a "sequence of events." As stated above, occurrence data indicate *what* happened during the accident. A total of 54 occurrence codes[3] are available to describe the events for any given accident. Because aviation accidents are rarely limited to a single event, each accident is coded as a sequence (that is, occurrence 1, occurrence 2, etc.), with as many as five different occurrence codes. For accidents that involve more than one aircraft, the list of occurrences is unique to each aircraft.

Occurrence data do not include any information about why an accident may have happened; the first occurrence can instead be considered the first observable link in the accident chain of events. First occurrence data are used with phase-of-flight data to characterize the initiating event in an accident sequence.

[3] Two of the codes, "missing aircraft" and "undetermined," do not represent operational events.

**Phase-of-Flight Data.** Investigators use phase-of-flight codes to describe *when* an occurrence takes place in the chronology of flight. These 50 distinct codes are classified into six major categories describing typical flight operations: takeoff or climb, approach or landing, maneuvering or hovering, cruise or descent, standing, and taxiing. Each category contains more specific detail about that phase of flight; for example, the category "standing" includes standing with engines operating, standing with engines not operating, and standing while starting engines.

**Findings, Factors, and Probable Cause Data.** In addition to coding accident occurrences and phase-of-flight data, the Safety Board determines probable cause. The objective of this determination is to discern the cause-and-effect relationships in the accident sequence. This could be described as *why* the accident happened. In determining probable cause, the Safety Board considers all facts, conditions, and circumstances associated with the accident. Within each accident occurrence, any information that helps explain why that event happened is designated as either a "cause" or "factor." The term "factor" is used to describe situations or circumstances that contribute to the accident cause. In addition are findings that provide additional information of interest to the investigation. The details of probable cause are coded as the combination of all causes, factors, and findings associated with the accident. Just as accidents often include a series of events, several causes and factors can help explain why an accident occurred. For this reason, a single accident report can include multiple cause and factor codes. Hundreds of unique codes are available to document probable cause information. These codes have been grouped into three broad cause/factor categories: aircraft, environment, and personnel.

**Narrative Data.** Natural language textual descriptions of the accident and accident probable cause are maintained in the database and can be retrieved with other specific information about the accident.

The five types of data can also be related to the factual component of the accident investigation and the analysis component of the investigation. The factual information and the narratives describing the accident represent the encoding in the database of the factual component of the investigation. The narrative describing the probable cause, and the occurrence codes, phase-of-flight codes, and causes, factors, and findings represent the encoding of the analysis component of the investigation.

Shortly after completing the on-scene investigation, investigators submit a preliminary factual report containing limited information about the accident or incident, such as date, location, aircraft operator, and type of aircraft. Once investigators have finished gathering and compiling information, they submit a factual report. After the investigation is complete, a final report is issued, which includes an analysis of the factual information, statement of probable cause and other contributing factors, and, if appropriate, a list of recommendations. For major accident investigations, the probable cause is approved by the five Members of the Safety Board or their designees; for general aviation accident investigations, approval authority may be delegated to the Director of Aviation Safety. Information about the accident and the investigation is available to the public after approval by the Safety Board or their designees.

## Accident Rate Data: Compiling Aircraft Flight Activity

All Part 121 and scheduled Part 135 carriers are required by regulation to report revenue flight activity[4] data to the Department of Transportation,[5] while on-demand Part 135 carriers are not. As a result, accident data in this review—and the method used to calculate accident rates—differ depending on the type of operation.

Part 121 and scheduled part 135 flight activity data, including flight hours, number of departures, and miles, are maintained by the Bureau of Transportation Statistics (BTS). These data are aggregated by the FAA's Systems Process Audit staff (AFS-40) to produce annual reports of flight activity. The flight activity measures are based on a full census of the active Part 121 and scheduled Part 135 fleet.

In contrast, flight activity data for on-demand Part 135 operations are estimated using the voluntary General Aviation and Air Taxi Activity (*GAATA*) *Survey*, which is compiled annually by the FAA. The *GAATA Survey* was established in 1978 to gather a sampling of information from owners of general aviation and on-demand Part 135 aircraft. The information includes flight hours, avionics, base location, and use, but does not include miles flown or number of departures. To conduct the survey, the FAA selects registered aircraft from its Civil Aviation Registry using a stratification procedure based on aircraft type and geographic region. Note that the small proportion of on-demand Part 135 aircraft in the survey, combined with low survey response rates, and the fact that the survey goes to aircraft owners rather than operators, results in an imprecise activity estimate.

[4] Activity data include revenue aircraft hours, revenue aircraft departures, revenue aircraft miles flown, and several others.

[5] Part 121 operators report activity monthly using Traffic Reporting System Form 41, Schedules T-100 and T-100(f), and quarterly using Scheduled Part 135 Operators Report, U.S. Bureau of Transportation Statistics (BTS) Form 298-C, Schedules A-1 and T-1.

Once *GAATA Survey* data are compiled, the FAA estimates flight hours, which the Safety Board includes in its annual reviews. Prior to 2002, the FAA estimated flight hours based strictly on *GAATA Survey* data. In 2002, the FAA changed its estimating method and revised its flight-hour estimates for on-demand Part 135 operations for 1992–2000. The revised activity estimate uses calculations that are based on the number of aircraft assumed to operate on-demand operations[6] and the average number of flight hours reported on the *GAATA Survey*. FAA's flight-hour estimates as revised for on-demand Part 135 flight operations are substantially higher than they would be using the previous method. For example, before the FAA changed its estimating method, the flight-hour estimate for the year 2000 would have been 2,430,000; estimated using the revised method, it is 3,552,881, an estimate that is 46.2% higher. This change in estimated flight activity results in a consistently lower accident rate calculation for the years 1992-2004. The change is so dramatic that the Safety Board maintains on its website[7] a comparison of flight-hour estimates for each year using both estimating methods. This review uses the revised activity measures for on-demand Part 135 operations.

The only flight-activity measure that is common for Part 121, scheduled Part 135, and on-demand Part 135 operations is flight hours. Although the number of departures is available for Part 121 and scheduled Part 135 operations, the flight-hour-per-departure rates for those operations differ greatly. Accordingly, this review calculates accident rates for Part 121 and scheduled Part 135 operations using the number of flight hours and departures. The number of departures or miles flown is not available for on-demand Part 135 operations and cannot therefore be used to calculate rates for those operations.

Prior to the 1998 review, activity rates were presented in units of hundred-thousands for flight hours and departures and in millions for miles flown. Because of an increase in activity and a decrease in accident numbers, and to facilitate interpretation of rate data, this review now presents aircraft activity data in units of millions for flight hours and departures and billions for miles flown; accident rates are calculated using flight hours and number of departures only.[8] Any comparisons with Safety Board data published before the 1998 review should take this change into account.

[6] Data are derived from the FAA's Vital Information Subsystem (VIS), a database used to track commercial aircraft operating certificates.

[7] See table 9a at <http://www.ntsb.gov/aviation/Table9a.htm>.

[8] From BTS, 2002 National Transportation Statistics (BTS-02-08), Table 2-9 for Part 121 Operations, Table 2-10 for Scheduled Part 135 Operations, and Table 2-13 for On-Demand Part 135 Operations.

# APPENDIX D

## Characteristics of the Air Carrier Fleet

The number of major air carriers did not change greatly between 1995 and 2002, ranging from 11 in 1995 to 14 in 2002 (table D1). However, the number of other carriers (including national, large regional, and medium regional) decreased after 1995 from a peak of 85 carriers.

Table D1: Number of Air Carriers, 1995 – 2002[1]

| | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 |
|---|---|---|---|---|---|---|---|---|
| Major Air Carriers | 11 | 12 | 13 | 13 | 13 | 15 | 15 | 14 |
| Other Air Carriers | 85 | 84 | 83 | 83 | 81 | 76 | 72 | 66 |
| **Total** | **96** | **96** | **96** | **96** | **94** | **91** | **87** | **80** |

The number of air carrier aircraft in the fleet increased 14% from 1993 to 2002 to a peak of 8,497 in 2001 (table D2). All of the increase was in turbojets, which increased almost 40% in that period, while the number of turboprop airplanes, piston airplanes, and helicopters declined.

Table D2: Air Carrier Aircraft Characteristics, 1993–2002[2]

| | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Fixed Wing** | 7,173 | 7,242 | 7,293 | 7,357 | 7,482 | 7,994 | 8,106 | 8,016 | 8,370 | 8,161 |
| Turbojet | 4,584 | 4,636 | 4,832 | 4,922 | 5,108 | 5,411 | 5,630 | 5,956 | 6,296 | 6,383 |
| Turboprop | 1,868 | 1,782 | 1,713 | 1,696 | 1,646 | 1,832 | 1,788 | 1,475 | 1,494 | 1,250 |
| Piston | 721 | 824 | 748 | 739 | 728 | 751 | 688 | 585 | 580 | 528 |
| **Helicopter** | 124 | 128 | 118 | 121 | 134 | 117 | 122 | 39 | 127 | 33 |

[1] BTS, 2006 National Transportation Statistics, Table 1-2 (June 2005). Air carrier groups are categorized based on their annual operating revenues as major, national, large regional, and medium regional. The thresholds were last adjusted July 1, 1999, and the threshold for major air carriers is currently $1 billion. The other air carrier category contains all national, large regional, and medium regional air carriers.

[2] BTS, 2006 National Transportation Statistics, Table 1-13 (January 2006).

Between 1990 and 2000, air carrier passenger miles increased 49.2%, and the average number of miles flown per aircraft increased 12.8%. Similarly, per-passenger-mile revenues for domestic scheduled air carriers increased steadily over the last two decades, with a record average high of 14.6 cents per mile in 2000.

The number of enplanements is another indicator of the aviation environment. In 2003, 639 million passengers boarded airplanes at U.S. airports. Figure D1 lists the number of enplanements at the top 20 airports in the United States in 2003.[3] As in previous years, Hartsfield Atlanta International Airport had the highest traffic volume with 39.4 million enplanements.

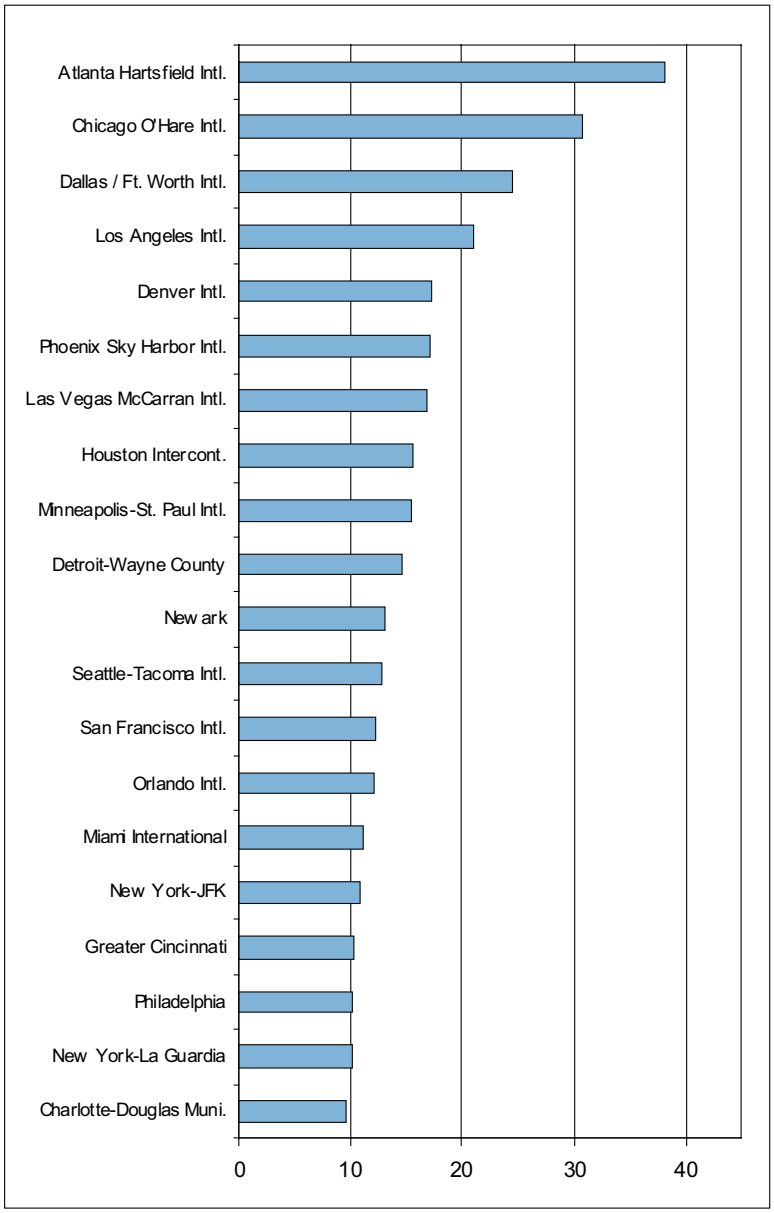
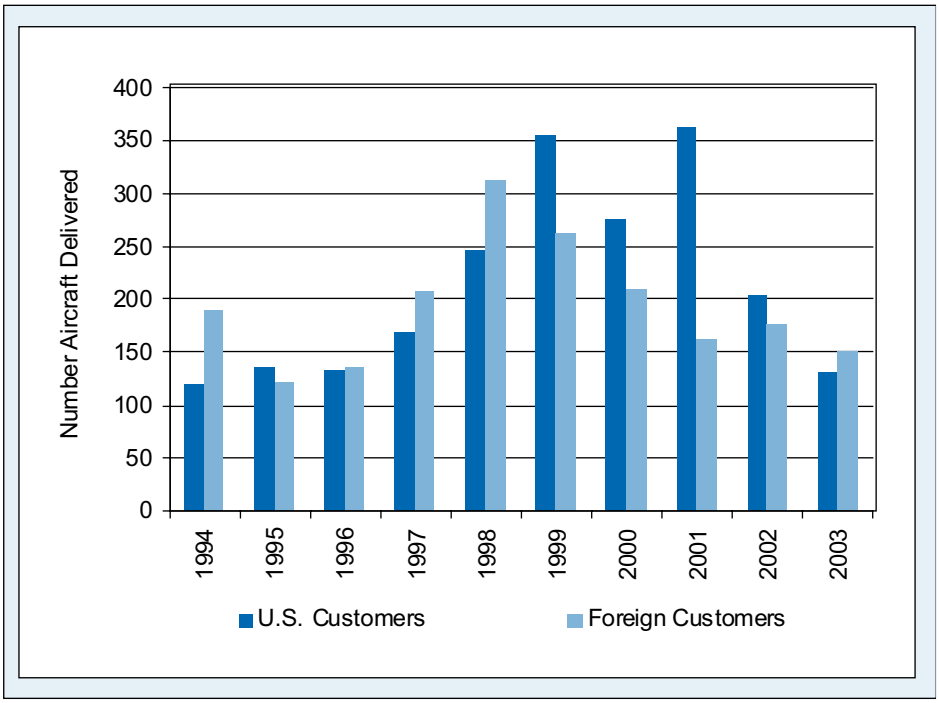


Figure D1: Enplanements (millions) in 2003 Top 20 U.S. Airports

[3] BTS, 2004 National Transportation Statistics, Table 1-41 (January 2005).

The number of jet transport aircraft deliveries was cyclical from 1994 through 2003 (see figure D2); total deliveries to U.S. and foreign customers peaked in 1999.[4] Deliveries to U.S. customers peaked in 2001, with deliveries in 2002 down 44% from that year. An average of 48% of all deliveries went to U.S. customers from 1994 through 2003, with a low of 39% in 1994 and a high of 69% in 2001. The least number of aircraft were delivered in 1995 (256 to all customers), and the most in 1999. The overall increase in aircraft deliveries after 1996 was accompanied by more deliveries to U.S. customers and a steady decrease in deliveries to foreign customers.




[4] Includes 707, 737, 747, 757, 767, 777, MD-11, MD-80, MD-90, MD-95, DC-8, DC-9, DC-10, and L-1011. Data are from Series 21, April 18, 2006. (See Aerospace Industries Association website www.aia-aerospace.org/stats/aero_stats/aero_stats.cfm).